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# Guidelines for Recovering Residential Waste Materials through Source Separation

July 1980



Ontario

Waste  
Management  
Advisory Board



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# **Guidelines for Recovering Residential Waste Materials through Source Separation**

July 1980



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## FOREWORD

These guidelines provide a step-by-step approach for separating recyclable residential waste materials from general residential waste and for selling the collected materials to the secondary materials industry for recycling into new products. The guidelines should be of interest to the following:

1. municipalities carrying out waste collection and/or disposal operations;
2. commercial waste haulers under municipal contract to collect and dispose of residential waste;
3. other independent enterprises under municipal contract or licence to carry out recovery activities;
4. individuals wishing to encourage or assist in the development of residential waste recovery programs in their municipalities.

Research for this document was conducted in 1979. Updates of marketing information and other aspects of program operation will be issued, as required, in the form of addenda to this document. Anyone wishing to receive these addenda should contact the:

Information Services Branch  
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## INTRODUCTION

Many of Ontario's cities and towns are faced with serious disposal problems. The amount of waste being produced is increasing, while existing disposal sites are being filled to capacity, and new sites are becoming harder to locate. As a result of current waste disposal practices, potentially recyclable materials such as paper, glass, metals, rubber, and plastics are being rendered inaccessible, and the land in which these valuable resources are buried, is being diverted from other uses. The value of the energy originally used to extract, refine, and process these resource materials is also being lost. In addition, some disposal techniques are potentially detrimental to the natural environment, posing the possibility of air, water, and soil contamination.



### Environmental benefits

In light of these considerations, the traditional ways of dealing with municipal waste are changing. Increasingly, such material is being regarded not as a waste to be irretrievably dumped, buried, or burned, but as a resource to be re-used or recycled. For individual municipalities and businesses, and for society as a whole, there are environmental and economic benefits to be gained from the recycling of waste materials.

The environmental benefits arising from waste materials recovery and recycling are considerable. Less waste has to be disposed of, resulting in a lessened demand for land to be set aside for disposal purposes. The consumption of virgin resources, including energy, is reduced. Air and water pollution are reduced in many instances when secondary materials are used in manufacturing processes. Individual awareness of resource depletion and waste management problems is increased by participation in waste materials recovery programs.

### Economic benefits

As landfill costs rise, and the costs of energy and other resources escalate, waste materials recovery and recycling programs are becoming more economically viable. Municipalities save on the costs usually associated with mixed waste collection, handling, and disposal procedures. Revenue accrues to program sponsors from the sale of recovered materials. Local jobs are created. The Canadian balance of payments is favourably affected when domestic secondary materials are used in manufacturing processes instead of imported materials.

Materials usually recovered

Residential waste consists of a wide variety of materials (see Table 1). The more common materials collected in residential waste materials recovery programs by means of source separation are newspapers, glass containers, and cans.\* Other types of waste materials that could be recovered in such programs include mixed papers and compostable leaves.\*\*

**TABLE 1†**  
**Residential Solid Waste Composition**

Waste Category	Percentage Composition (by weight)
1. Paper (10% newspapers, 25% other) .....	35
2. Food wastes .....	22
3. Yard wastes .....	15
4. Glass .....	8
5. Metal (7% containers, 1% other) .....	8
6. Plastic .....	3
7. Wood .....	3
8. Rubber and leather .....	2
9. Cloth .....	2
10. Other miscellaneous .....	2
	100%

Ontario potential

In Ontario, the potential for materials recovery from residential sources is considerable. Of the approximately 6,750,000 tons‡ of urban solid wastes generated annually in the province, about 3,375,000 tons comes from residences. Of this amount, approximately 845,000 tons or about one-quarter of the residential solid waste stream consists of newspapers, glass containers, and cans that could be kept separate and recycled.

**GENERAL CONSIDERATIONS**

Generally straightforward in its basic concept, a residential waste materials recovery program can be a complex operation to design and establish. Numerous variables must be considered and the program carefully designed to complement local waste management practices and to satisfy prevailing market conditions. In general, it is necessary to consider:

- 1. what markets exist, and therefore what materials to recover;
- 2. where, when, and how to recover materials;
- 3. where to store collected materials if not directly transported to end-use buyers or dealers;
- 4. how to structure the program in order for it to be economically viable.

The economic factor

The collecting and selling of waste materials is essentially a volume business—the greater the quantities of materials separated, the more viable a program is likely to be. Market values for recoverable waste materials vary according to fluctuating supply and demand conditions, type of buyer, and material quality. In 1979, the prices being paid in Ontario for the principal materials were as follows: newspapers, \$15-45/ton; glass containers, \$20-35/ton; cans, \$0-30/ton.

How the program works

Residential waste materials recovery through source separation begins in the home with the participating residents keeping recyclable materials separate from wastes destined for disposal. These “source-separated” materials are then put out at curbside for collection and delivery, either to dealers or end-use buyers, or to an aggregation point for combination with materials from other collection routes before being sold for recycling purposes.

\* Metal containers of the type used for foods and beverages.  
\*\* Yard wastes, most of which are compostable, constitute about 15 per cent by weight of total residential waste (see Table 1).  
† Taken from *Urban Solid Waste Generation in Ontario, July 1976*, Ontario Waste Management Advisory Board, Page 7.  
‡ All tonnage figures are in U.S. tons (i.e., 1 ton = 2,000 pounds) in which recovered materials in Ontario are usually measured.

In some situations, depots—i.e., drop-off points to which residents take their separated materials—may have to be employed. Depots are particularly useful for condominium developments and apartment buildings and in areas that have low housing densities or no regular waste collection service. However, although generally cheaper to operate, the depot approach results in 1) lower material recovery levels because of its greater inconvenience to residents and 2) higher overall energy usage because deliveries usually involve special trips by private vehicles.

The program presented in this publication is concerned with the curbside collection of source-separated residential waste materials by the municipality or its agent. For information on the establishment of depots, see Appendix F.

## ACTION FRAMEWORK

The development of a successful residential waste materials recovery program through source separation demands careful organization and planning. The following action sequence, explained in detail on successive pages, provides a basic framework for establishing and maintaining such a program:

### STAGE ONE: PLANNING THE PROGRAM

- Designate a planner/co-ordinator
- Define the area of operation
- Decide on materials to be collected
- Estimate potential recovery
- Assess the marketplace

### STAGE TWO: DESIGNING AND DEVELOPING THE PROGRAM

- Design the operating system
- Project program economics
- Obtain support for the program

### STAGE THREE: STARTING UP THE PROGRAM

- Finalize marketing agreements
- Prepare the program for start-up
- Initiate a public awareness campaign

### STAGE FOUR: MAINTAINING AND IMPROVING THE PROGRAM

- Sustain publicity
- Enlarge the area of operation
- Expand to other waste sources
- Monitor the program



Newspapers being picked up from curbside. (Photo courtesy of Is Five Foundation.)



Glass being delivered to depot.

## STAGE ONE: PLANNING THE PROGRAM DESIGNATING A PLANNER/ CO-ORDINATOR

The planner/co-ordinator should be a person already knowledgeable or ready to become so in the following areas:

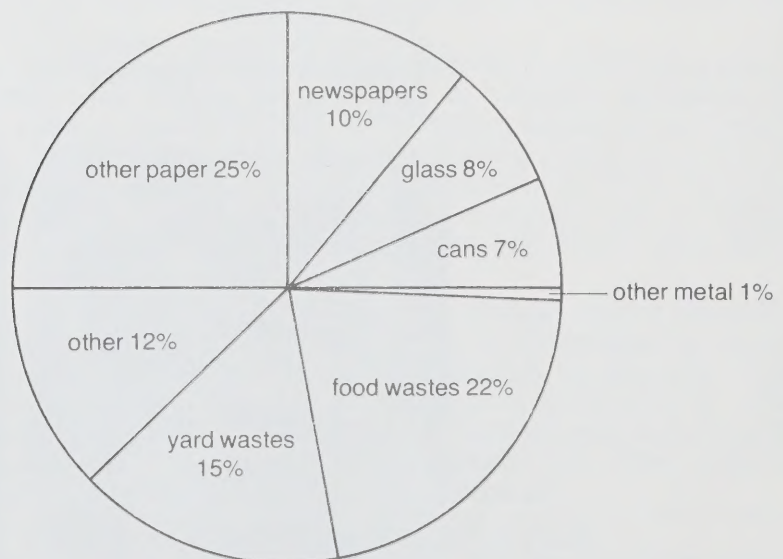
- existing community waste management operations;
- data collection and analysis techniques;
- bulk materials handling techniques (vehicles and other equipment);
- business negotiation (purchasing and marketing ) procedures;
- public relations and liaison work;
- administrative, legal, and accounting practices;
- local decision-making procedures.

## DEFINING THE AREA OF OPERATION

The area of program operation should be established as early as possible in the preliminary planning process. The boundaries of a program area are defined by its collection routes. They may first have to be set on a tentative basis and then adjusted later after consideration of material recovery potentials and market opportunities. Quantity requirements may lead to the inclusion of other areas within the same municipality or the development of joint programs with adjoining municipalities.

## DECIDING ON MATERIALS TO BE COLLECTED

A residential source separation program should be developed around the materials available in the greatest amounts and/or for which the best markets exist. The quantities of recoverable materials found in a given community depend upon a variety of factors: number of residents, home waste management practices, and consumer consumption patterns. Consumption patterns vary with size of community, proximity to large urban centres, and lifestyle factors.



### Residential Solid Waste Composition

Information taken from Table 1. 'Other' includes plastic, wood, rubber and leather, cloth, and other miscellaneous.

# ESTIMATING MATERIALS RECOVERY

Before buyers can be approached to negotiate prices and services, it is necessary to obtain preliminary estimates of the quantities of material(s) that are likely to be recovered from the intended program area. Recovery estimates also help determine labour and equipment requirements and indicate how much of the community's waste load might be diverted from landfill.

In order to estimate the quantities of recyclable materials that **might** be recovered, it is necessary first to determine the **total** amounts available in the area—i.e., the amounts that could be recovered in a community if every household participated on a 100 per cent basis.

The total amounts of recyclable materials available can be determined in a number of ways—most accurately through the use of local residential waste generation data.

These data may be available from engineering studies carried out on previous occasions and/or weight-scale data from disposal sites. In the absence of such data, estimates can be determined by actually conducting a sample survey of local residential waste to determine its composition; however, this is a difficult and time-consuming process.\*

A simpler method for determining the total amounts of recyclable materials available is to make use of a standard formula approach. It is emphasized however that this approach is based upon averaged figures, which may not be applicable in all circumstances.

Underlying the formula approach are the following two assumptions:

- 1. a residential waste generation figure for all of Ontario of 2.2 lbs. per person per day.\*\*
- 2. percentage of total composition figures\*\*\* for the three types of residential waste as follows:
  - a) newspapers 10 per cent
  - b) glass containers 8 per cent
  - c) cans 7 per cent

For a municipality of 30,000, therefore, the total estimated residential waste generation would be 30,000 x 2.2 lbs. = 66,000 lbs. per day, including the following amounts for the three waste fractions:

- For newspapers: 66,000 x .10 = 6,600 lbs. or 3.3 tons/day
- For glass containers: 66,000 x .08 = 5,280 lbs. or 2.64 tons/day
- For cans: 66,000 x .07 = 4,620 lbs. or 2.31 tons/day

Once the total amounts of recyclable materials available have been determined, it is then necessary to estimate a **range** of probable recovery rates, which will indicate the quantities **likely** to be recovered for each recyclable material. Because of a number of factors (collection system design, amount and type of publicity, local conditions), these quantities are likely to be considerably lower than the total amounts available and will also vary considerably from program to program. It is important to note, however, that without a test program, it is impossible to project accurately the quantities likely to be recovered.

Table 2 provides a range of probable recovery rates for newspapers, glass containers, and glass cans. The figures were developed from the formula approach used earlier for estimating the quantities of materials available from a community with a population of 30,000.

\* For more information on the waste sampling process, see Appendix D, which also contains information on how to go about estimating potential newspaper recovery on the basis of local production/consumption data.  
\*\* Figure obtained from **Urban Solid Waste Generation in Ontario**, July 1976, Ontario Waste Management Advisory Board, page 1.  
\*\*\* Taken from Table 1 of this report.

**TABLE 2**  
 Realistic Recovery of Recyclable Materials  
 from Community of 30,000

Material Type	Amounts Available per Day (Pounds)	Total			
		Projected Recovery per Day at Realistic Recovery Rates (Pounds)			
		15%	30%	45%	60%
Newspapers	6,600	—	—	2,970	3,960
Glass	5,280	792	1,584	—	—
Cans	4,620	693	1,386	—	—

## ASSESSING THE MARKETPLACE

With basic decisions made concerning the types and probable quantities of materials to be collected, approaches can be made to potential buyers of the materials regarding prices, quality specifications, and delivery requirements.\* Estimates of revenues and costs, including transportation costs, can then be used to make preliminary economic projections for the intended recovery program. Several buyers should be approached concerning each material to be collected in order to obtain as comprehensive a picture as possible of prevailing market conditions.

Buyers of waste materials prefer regular, frequent, large-quantity deliveries of materials. Irregular, infrequent deliveries may be accepted, but lower revenues may be paid. Initiators of programs in very small communities will want to compensate for low volume by keeping costs to a minimum, storing collected materials for longer periods, and co-operating with program initiators in nearby communities.

### Newspapers

Types of buyers

There are basically two types of buyers of recovered newspapers:

1. end-use buyers, such as paper mills and cellulose insulation manufacturers;
2. dealers and brokers, functioning as intermediaries between program sponsors and end-use buyers.

Price variability

Prices for recovered newspapers have traditionally fluctuated in response to changes in supply and demand for products containing waste paper. Insulation manufacturers may offer seasonally high and low prices. Dealers and brokers tend to offer more consistent, but lower, prices because they supply a variety of other buyers.

Paper bound for mills must usually be baled and shipped regularly in large quantities. Operators of recovery programs with low quantities of material and/or without baling equipment have therefore tended to sell to intermediaries.

Questions for buyers

When approaching buyers, be realistic in estimating the quantities of newspapers that can be delivered. The following are questions to be asked of potential buyers:

*\*See Appendix A for a list of major buyers of recovered materials in Ontario.*

**Prices.** What prices are paid? How are prices affected by volume delivered and material quality and preparation? How stable are prices on a short (seasonal) and long-term basis?

**Contamination.** What materials are acceptable/unacceptable (i.e., telephone directories, heavily coloured newspaper sections, wet, or yellowed papers)? What is considered a contaminant? What are the consequences of a contaminated load? Will the whole load be rejected? Will price fall?

**Material Preparation.** How should material be prepared for delivery? May it arrive loose? In paper bags or in bundles tied with string? Does the paper have to be baled? What size bale is acceptable? What effect will different preparation techniques have on price paid?

**Buyer Services.** Are any services provided? Can a bulk container, a baler, or transportation be provided? Can any of these be arranged for, if not provided?

**Delivery.** What hours and days are deliveries accepted? What are the off-loading characteristics at the buyer's site?

**Payment Arrangements.** Are long-term contracts offered? How are prices determined under a contract? Would a contract have a minimum price? Are payment cheques issued at the point of delivery? If not, what waiting period is there likely to be?

## Glass Containers

Types of buyers

In general, approaching glass buyers is a simple matter than approaching newspaper buyers. The main buyers of glass containers in Ontario are glass manufacturers with plants in Toronto, Bramalea, Hamilton, Milton, and Wallaceburg. Quebec glass manufacturers are located in Montreal, Candiac, Pte. St. Charles, and St. Pierre.

Prices

Prices for glass containers have traditionally been fairly stable, increasing in recent years to \$20-\$35 a ton. Prices vary with the degree of contamination and the amount of colour mixing. Higher prices may result from large quantities delivered.

Separation by colour

At manufacturing plants, green and amber glass cannot be added to batches of clear glass, but mixed green/amber/clear glass can form a portion of both green and amber batches. Glass container manufacturers purchase glass that has been sorted into individual colours as well as unsorted. The plants in Hamilton and Wallaceburg, however, use only clear glass.

Technological upgrading

A glass "beneficiation plant," which upgrades glass to the specifications of purchasers, is now operating in Southern Ontario. This processing operation removes contaminants, such as attached metal neck rings and caps. Glass sold to the plant does not have to meet stringent quality standards, but lower prices are paid as a result. Glass for such plants should be broken with caution, as successful contaminant removal can only be managed with larger size pieces.

Approaching buyers

When approaching buyers, be realistic in estimating the quantities of glass that can be delivered. Glass buyers traditionally have not offered contracts or services. Glass buyers usually pay on receipt of material, and their plant sites can accommodate a range of delivery vehicles, including railway cars. A minimum delivery quantity is not usually required.

Questions for buyers

The following are questions to be asked of potential buyers concerning price and delivery arrangements:

**Prices.** What prices are paid? How are prices affected by quantity, contamination, and colour sorting?

**Delivery.** What hours and days are deliveries accepted? What are the off-loading site characteristics of the buyer's site?

## Cans

Types of buyers

The main buyers of recovered cans are scrap dealers and a de-tinning plant in Hamilton.

## Prices

The de-tinning industry has generally paid consistent but low prices for cans. Some scrap dealers are unwilling to purchase cans, but will accept them on a no-payment basis. Some buyers prefer food "tins" and pop cans to be kept separate because of the latter's aluminum content. The price range in 1979 was \$0-\$30 a ton.

## Approaching buyers

When approaching buyers, be realistic in estimating the quantities of cans that can be delivered. The de-tinning plant in Hamilton has traditionally not provided containers or transportation, but some scrap dealers may be willing to provide some services. Questions for buyers can be modelled on those for newspapers and glass containers. Material quality questions would be concerned with the need for flattening and label removal and related price impacts.

## STAGE TWO: DESIGNING AND DEVELOPING THE PROGRAM

### DESIGNING THE OPERATING SYSTEM

The operating system of a residential source separation program consists of two or three phases.

In the two-phase system, collection vehicles deliver their loads directly to local buyers.

In the three-phase system, usually necessary for low-volume programs or when local buyers are not available, loads are taken to a handling facility for aggregation, processing (if necessary), and shipping.

### Collection

Existing general refuse collection methods form the starting point for designing a residential source separation program based on a system of curbside collection.

Designing the curbside collection system involves making four interconnected decisions:

1. Will the pick-up of recyclables be integrated with general refuse collection or not?
2. When two or more recyclable materials are being collected **independently** of general refuse, will they be picked up together at one time (the single pass approach) or will each material be picked up separately at different times (the multiple pass approach)?
3. How frequently will pick-ups be made?
4. What type of collection vehicle should be used?

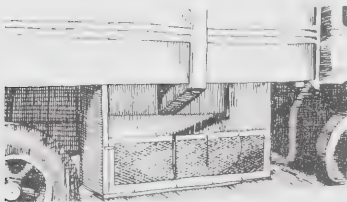
Recovered materials can be picked up along with general refuse using the same vehicle at the same time, or independently from general refuse collection either on the same day or on a different day.

Pick-up of recyclables along with general refuse is possible if compartments and/or trailers for recovered materials can be added to collection vehicles. Racks, for example, can be attached between the axles and/or over the compactor hopper of packer trucks. This approach offers maximum integration with overall waste management systems, lowest start-up costs, and maximum convenience to residents. However, it also requires residents to set out general refuse and recovered materials in a clearly separated manner and demands alertness on the part of collection crews. As a result, collection routines are considerably altered and lengthened. In addition, different compartments may fill up at different rates, and drop-off spots for certain materials may have to be established along the route.

## Collection design questions

## Collection approaches

### Pick-up of recyclables with municipal refuse collection



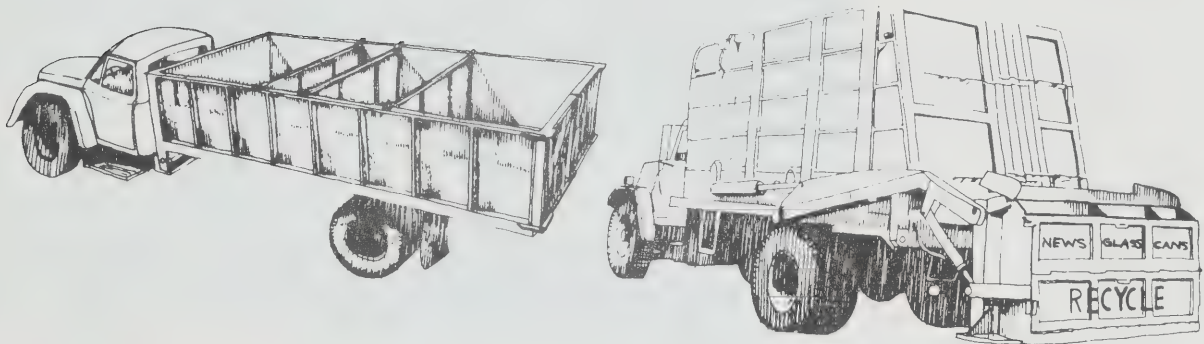
Side-loading rack. (Drawing from Source Separation Collection and Processing Equipment, U.S. Environmental Protection Agency, listed in Appendix C.)

Pick-up of recyclables independently of municipal refuse collection

Pick-up of recyclables independently of general refuse may occur on the same day or on a different day depending on the availability and adaptability of vehicles. The different-day approach is generally recommended because collection crews do not then have the problem of distinguishing between separated and general refuse materials. Separated materials set out alone also act as visible advertisements for the recovery program, thus encouraging increased participation.

When two or more recyclable materials (e.g., newspapers and glass containers) are to be picked-up independently of general refuse, the question arises as to whether they should be picked up together in a single pass or separately at different times in multiple passes.

The single-pass approach requires a vehicle designed or modified to keep the collected materials separate from each other. With the multiple-pass approach, there is no need for special vehicle design,



Compartmentalized dump truck and compartmentalized rear-loader. (Drawings from Source Separation Collection and Processing Equipment, U.S. EPA.)

but more energy and time are spent in repeating passes. The multiple-pass approach is more appropriate when vehicle modification is not feasible, but the separate passes should, if possible, occur on the same day so that residents are not confused with a different schedule for each material.

Frequency of collection

Weekly pick-ups, whether in conjunction with general refuse collection or not, are generally recommended for maximum convenience to residents and therefore highest possible recovery. Less frequent collection schedules are harder for residents to remember and, because of household storage problems, usually result in lower quantities being recovered.

Vehicle and crew considerations

Factors related to choosing a vehicle for picking up recyclables independent of municipal refuse, whether by a municipality or contractor, include: crew requirements, collection methods, quantities of materials to be recovered, vehicle capacity, vehicle availability.

Spare vehicles may be available from existing refuse collection operations, especially if refuse is not collected every day of the working week. Packer trucks, which consume more fuel and have greater capacity than smaller vehicles, should not normally be employed, however, in small collection areas where recovered quantities are low. Low-cab, side-loading vehicles require only one crew member and are generally sufficient for areas of low housing density. Rear-loading vehicles with a driver and collector are more efficient for areas of high housing density where both sides of the street are collected by a crew member working from the rear of the vehicle.



Box-bed van\*

Independent enterprises will not have access to municipal collection vehicles; therefore, other vehicles, new or used may have to be purchased or rented. It is usually cheaper over the long-term to buy rather than rent vehicles, unless a vehicle is to be used for a very small pilot test area and/or employed for only one or two days per week. Pick-up by a two-person crew in a light-weight, low-bed box van is usually a cost-efficient approach. A special hydraulic-loading vehicle, suitable for municipalities able to collect two or three recyclable materials concurrently, is being tested in one Southern Ontario program (the DRECT truck).



The DRECT truck, developed by the Is Five Foundation and being used in the Borough of East York (Metropolitan Toronto). The truck is tricompartmented and is equipped with a modified tailgate loader. (Photo courtesy of the Is Five Foundation.)

Because vehicles have weight and volume limits, early developed estimates of recovery are essential. Weights can be converted to volume on the basis of one cubic yard being able to contain approximately:

- 500 lbs. of flat, loose newspaper;
- 600 lbs. of whole glass containers;
- 1,000 lbs. of glass containers broken into 3-4 large pieces;
- 200-300 lbs. of flattened food cans mixed with unflattened pop cans on a two-to-one ratio basis.

If containers such as drums are employed to hold metal and glass inside open vehicles, vehicle capacity may be limited to a single layer of containers with limited walk space.

## Time requirements

Collection time will vary with the number of stops, the amount of time spent at each stop, and the travelling time between stops. Time must also be allowed for lunch and breaks, travel to and from routes, and the number of off-route, off-loading trips required each time the vehicle fills to capacity.

## Handling

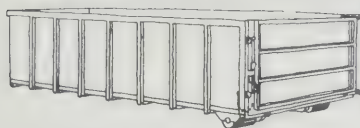
A handling phase in the operating system (required usually when local buyers are not available) may include the following activities: off-loading, storage, processing, warehousing and shipping.

The key variables in determining the labour, equipment,\*\* and space requirements of a handling facility are as follows:

- the amount of material to be handled and stored over a given period of time;
- the types of handling and processing activities to be carried out.

\* Drawing from Source Separation Collection and Processing Equipment, U.S. EPA (listed in Appendix C).

\*\* Sources of handling equipment are listed in Appendix B.



Roll-off container\*

**Off-loading and storage.** Incoming materials are delivered directly into containers—usually roll-off containers that can be lifted by haul vehicles. Sufficient space must be allowed for storing the containers and manoeuvring the vehicles that lift them. If container storage is indoors, the ceiling and door(s) of the loading area should be at least 17 feet high to accommodate bulk-lift vehicles. Since roll-off containers may stand as high as eight feet, an access ramp will usually be necessary if collection vehicles are to off-load directly into containers; otherwise, containers could be placed with one end below grade for off-loading purposes. Handling facility labour will be necessary to co-ordinate off-loading and loading.

**Processing\*\*** The processing of materials involves reducing their volume and/or upgrading their quality.

Volume reduction saves space by increasing the weight of material that can be stored and shipped in a given unit of volume. Glass containers are crushed; cans are shredded or flattened; newspapers are shredded and/or baled. (Paper mills are not generally equipped to handle loose newspapers.)

Volume reduction of glass and cans is justifiable only when savings in shipping costs per ton more than offset the processing cost. Volume reduction of glass can be achieved by mechanical crushers or by manual means (smashing glass with an iron bar or letting glass fall down a chute). Volume reduction of cans can be achieved by mechanical shredders or compacting devices, although the flattening of food “tins” by residents is a more economical approach. If volume reduction machinery is to be used, its capacity should be matched with the quantity of material to be processed. Labour requirements vary with machine capacity.

It is generally more economical to sell baled than unbaled newspapers, unless local buyers are located nearby and are reliable. The baling of newspapers is also considered a form of upgrading.\*\*\*

Material quality is improved by the removal of contaminants and the sorting of material types into subcategories. Contaminant removal may include taking paper labels off food tins, as well as metal caps and neck rings off glass bottles; discarding any dishware and lightbulbs found with glass containers; and separating out non-newsprint grades of paper and non-fibre material from newspaper. Sorting of material types into sub-categories includes separating glass into three colours and food “tins” from pop cans.

In most instances, the upgrading of glass and cans at a handling facility is not financially justifiable. Available mechanized equipment is not suitable for small-scale operations, and manual contaminant removal is extremely time-consuming. For example, four to six person-hours per ton is required for the removal of caps and neck rings from contaminated glass. **The economic trade-offs** involved in such a situation **should be carefully evaluated**, as the loss of revenue resulting from glass not being de-contaminated may be more than offset by the reduced labour costs involved.

**Warehousing.** Warehousing is sometimes necessary where processing takes place. Activities may include the mechanical transfer of materials between various containers, vehicles, and processing equipment and storage areas.

**Shipping.** Recovered materials are aggregated for the period of time necessary to acquire loads large enough to ship to buyers. Shipping recovered materials in large loads reduces the number of trips to buyers and therefore saves transportation costs.

\*Drawing from Source Separation Collection and Processing Equipment, U.S. EPA (listed in Appendix C).

\*\*For detailed information on processing activities, see **An Evaluation of Handling Stations in Waste Reclamation Systems**, November 1979, Waste Management Advisory Board.

\*\*\*See Appendix E for information on baling and handling of newspaper.

Volume reduction of glass and cans

Volume reduction of newspapers\*

Upgrading

Upgrading of glass containers and cans

## Transportation to Buyers

Chief concerns to be considered during design of the transportation phase of the recovery program are, as follows:

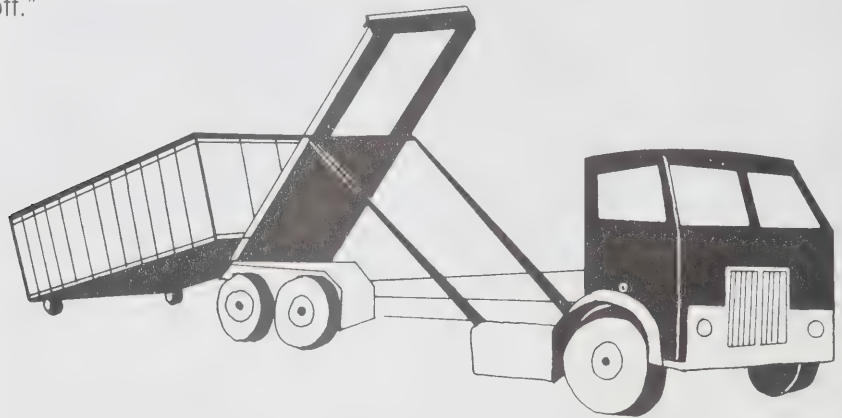
1. method of transport;
2. provider of transport;\*
3. frequency of transport.

### Method of transport

Recovered materials are usually shipped to buyers by truck. Railhaul can be considered for very long distances, but if handling facility and buyer sites are not adjacent to rail spurs, then trucking is necessary to complete the transportation process.

There are two basic trucking options depending on whether the materials are to be shipped in loose condition or otherwise (i.e., baled or in small containers).

Roll-off containers carried on hoist-equipped trucks are best for materials being shipped in loose condition. Tractor trailers and vans are more suitable for newspapers that are baled and glass and cans that are contained in pallet boxes, drums, or bins. The use of tractor trailers and vans, however, entails additional handling of materials and/or containers that must be either returned to the facility or "written off."



Hoist-equipped truck with roll-off container. (Drawing from Operating a Recycling Program: a Citizen's Guide, U.S. EPA, listed in Appendix C.)

### Provider of transport

Some buyers may provide transportation for recovered materials; however, it may nevertheless be more economical to make separate transportation arrangements. In this event, it will be necessary to cost out various options such as using existing refuse fleet vehicles; buying or renting vehicles; or contracting haul services, including cartage, back-haul, and bulk-lift. Bulk-lift containers can be purchased or rented. Terms of rental should be discussed as they may differ from firm to firm. Charges for roll-off containers are usually included in haulers' lift fees. The tractor-trailer transport of baled newspaper (often by back-haul) is usually paid for by mill buyers.

### Frequency of transport

Shipment frequency will depend on the quantity of materials recovered at a given interval and the capacity of shipping containers/vehicles.

The capacity of the largest standard roll-off container is 40 cu. yds. A container of this size can hold about 10 tons of loose newspaper, four to six tons of flattened food cans mixed with unflattened pop cans (on a two-to-one ratio basis), or 20 tons of glass containers broken into three or four large pieces each.\*\*A large tractor trailer can hold about 20 tons of high density baled paper.

\*Sources of transportation vehicles are listed in Appendix B.

\*\*Most haulers will not recommend filling a 40 cu. yd. container more than one-half to three-quarters full of broken glass because of highway load-weight restrictions. Tonnage figures are derived from the weight-to-volume conversions provided on Page 10.

Related concerns

Examination of transport options may indicate that certain buyers are to be preferred over others, in terms of cost-per-load/revenue-per-load comparisons. For instance, it may be more economical to transport metal to a local scrap dealer than to the Hamilton de-tinning plant. It may also be necessary to drop a material from the recovery program if the cost per load cannot be justified by revenues and other credits. In 1979, for example, the recovery of cans was unattractive for the following reasons: 1) low revenues, 2) the high cost per load of shipping unprocessed cans, 3) the high cost of reducing the volume of cans for loads of greater weight. Finally, it may be necessary to reconsider plans related to processing if a greater density of material is necessary to achieve economical shipments.

PROJECTING PROGRAM ECONOMICS

At this stage in the planning process, all costs and revenues related to the program must be assessed. This assessment will provide a measure of program cost efficiency; however, economic viability can only be estimated at this point in time.

Costs

Capital, operating, and maintenance costs should be projected monthly for each of the three phases of the operating system: collection, handling, and transportation. Administrative and promotional costs will also need to be projected for the initial and ongoing phases of the program.

Capital costs

Capital costs are non-recurring costs such as those for equipment purchase, modification, and installation; site purchase; ramp construction; office furniture; electrical upgrading; etc. Such costs should be spread over a five-year period at current rates of amortization, depreciation, or capitalization.

Operating costs

Operating costs are usually recurring costs such as those for equipment rental, site rental, collection and handling labour, vehicle registration, fuel, insurance, telephone, office supplies, site taxes, utilities, and contracted transportation services.

Maintenance costs

Maintenance costs include those associated with the servicing of equipment, including labour, replacement parts, and supplies for repair and upkeep.

Some Cost Assessment Factors

	Capital Costs	Operating Costs	Maintenance Costs
Collection	vehicles; depots & liners; hydraulic tail & instal- lation	labour;* vehicle fuel, insurance & registration; labour over- time for missed pick- ups	labour; vehicle parts, lubri- cation; washing com- pounds
Handling	baler pur- chase & instal- lation; forklift; electrical rewiring	labour;* bale straps; propane; site rent, utili- ties, and insurance	labour; equipment parts & lubrication; site upkeep supplies
Transportation		container bulk-lift fees	

*\*Includes Unemployment Insurance, Canada Pension, Workmen's Compensation, and additional employee benefits.*

Cost variations	The actual inputs into cost projections vary with program circumstances. For example, there may be differences from program to program regarding the following: wages paid; benefits covered; collection vehicle type; number of route/off-route miles (these items determine both fuel and maintenance estimates); equipment capacity (higher capacity equipment generally has higher capital but lower operating costs than lower capacity equipment); equipment age (older equipment generally has lower capital but higher maintenance costs).
Administrative/overhead costs	Administrative/overhead costs will also need to be projected to cover the following: consulting, legal, and accounting services; employment and business taxes; arrangements with buyers and haulers; planning and data collection. It is traditional to list secretarial and management staff salaries as administrative costs rather than as operating costs.
Promotional costs	Promotional costs include such items as initial design work and printing of logos, brochures, pamphlets, and signs, plus on-going costs for maintaining publicity.
Allocating costs	<p>There are two main methods of allocating costs:</p> <ul style="list-style-type: none"> <li>—on a full-cost basis;</li> <li>—on a direct-cost basis.</li> </ul> <p>On a <b>full-cost basis</b>, all program expenses are counted. These expenses, therefore, include not only all direct costs associated with the source separation program but also a portion of overhead or other indirect costs, where source separation is carried out in parallel with mixed refuse collection or other public works activities. Difficulty with this method can arise, however, when portions of shared overhead costs attributed to the source separation program are assigned or allocated in an arbitrary manner. When accounting is conducted on a full-cost basis, allowance should be made for any volunteer labour that may be donated by citizens in the start-up period but later may have to purchased.</p> <p>On a <b>direct-cost basis</b>, only the expenses that can be readily identified with the source separation program are included. For example, labour, equipment, and overhead costs, already budgeted to mixed refuse collection or other public works activities, are not included.</p> <p>In reality, program costs are usually allocated somewhere between a full- and direct-cost basis, depending on local circumstances (e.g., municipal accounting procedures). In order to portray program cost projections fairly and usefully for evaluation purposes, both methods of allocating costs should be considered.</p>

## Revenue and Cost-Savings

Revenue	Revenues arise from the sale of recovered materials. To estimate revenues, multiply the expected number of tons of each material to be recovered by the price per ton quoted by buyers.
Cost-savings	<p>Cost savings result from costs not incurred. Disposal site entrance fees not incurred as a result of a source separation program may represent cost-savings. The access fee is usually costed on a per-ton basis. It is therefore possible to calculate this cost-saving simply by multiplying the number of tons of material recovered (or diverted from landfill) by the access fee. This fee varies widely from one municipality to another.*</p> <p>Provided significant quantities of materials are diverted away from regular refuse collection, the costs of regular collection may be reduced or at least stabilized, whether or not the source separation program is carried out in conjunction with regular collection. This cost</p>

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\*Access fees are usually required for packer trucks entering a landfill site.

saving will be reflected in future tenders or contracts and is directly attributable to the source separation program.

Further cost savings may be achieved if there is a decrease in the following:

- vehicle maintenance and fuel costs (e.g., fewer trips to landfill);
- collection fleet operating costs (trucks can collect mixed refuse from more homes before reaching capacity and can travel more route-miles before leaving routes to off-load);
- disposal-site operating costs (lessened labour and equipment requirements);
- disposal-site capital costs (extended landfill life).

There may be difficulties associated with quantifying cost-savings, but they should not be excluded from the ledger for that reason. The problem is likely to be a short-term one; in the long run, tenders and contracts will be favourably affected in monetary terms.

## **Grants and Subsidies**

Grants and subsidies should be represented in economic projections. This category is not, however, usually counted in net calculations because it distorts (i.e., deflates) the cost of a program. If grants or subsidies are included at the time they are awarded, they should be deducted from gross revenue at the end of the bookkeeping year to provide a true economic picture for the program.

## **OBTAINING SUPPORT FOR THE PROGRAM**

Once the operating system has been designed and the program economics have been projected, the plan should be presented to relevant civic officials and politicians for discussion, possible revision, and formal approval. Obtaining support for the program and designating a program operator will also require legal and financial arrangements to be made.

If the program operator is not the municipality, a tender, contract, or licensing agreement will need to be prepared and authorized. This may include planning for future revisions in the current refuse contract. Legal activity may include the drafting of supportive by-laws such as anti-scavenging laws or front-yard laws.

A budget must be developed and authorized by the municipality for its own operation of the program, or for a contract award, or for fiscal responsibilities to be shared with an independent enterprise.

### **STAGE THREE:**

## **STARTING UP THE PROGRAM**

## **FINALIZING MARKETING AGREEMENTS**

Once the source separation program plan has been approved, a final choice of buyers should be made. At this point, the chosen buyers should: 1) confirm the information they provided in earlier approaches in order that the operating system can be adjusted, if necessary, to be compatible with their requirements, and 2) be prepared to finalize their marketing agreements.

Marketing agreements can be made either on a contract or non-contract basis. If possible, written contracts should be obtained, as guaranteed pricing offers stability to the seller. Non-contract agreements entail more work for the seller, involving vigilant monitoring of the marketplace and frequent negotiating with different buyers. In general, contract agreements result in lower prices to the seller during high-market demand but higher prices to the seller during low-market demand.

Contract agreements

There are three types of contracts to be considered when finalizing agreements with buyers:

- 1. fixed price;
- 2. floating price;
- 3. periodic review.

The **fixed price** contract involves the pre-determination of a price between buyer and seller. It helps to ensure an adequate price for start-up and is particularly useful when seeking a contract of less than one year. A buyer will generally not sign such a contract for a longer period out of concern that market prices might fall below the agreed upon price for the materials being purchased.

The **floating price** contract allows for the price to rise or fall according to the changes in an agreed upon market index. It is common for this type of contract to have a floor price. Floating price contracts are longer term than fixed price contracts and provide additional protection for both the buyer and the seller.

A **periodic review** contract allows for occasional re-negotiation of an initially fixed price. This type of contract is useful to address improvements in the supply of acceptable materials, shifts in market prices, and other relevant factors.

All contracts should include the pricing structure, duration of the contract, buyer specifications, and minimum tonnage requirements. If a buyer is involved in the provision of equipment to a program, he usually stipulates a long-term contract. This affords him with the best opportunity of recovering his initial investment.

PREPARING THE PROGRAM FOR START-UP

Preparing the program for start-up involves a number of activities, including ordering equipment, hiring workers, and, if necessary, designating handling facility sites.

Ordering equipment

The various pieces of collection, handling, and transportation equipment required for the program may be leased, purchased, or borrowed from existing operations. Handling equipment will need to be installed, and various pieces of equipment may need modification. Shopping for "good deals" is important. Equipment acquisition may involve developing specifications and tendering. Equipment delivery sometimes takes several months.

Hiring workers

Job descriptions should be created for operational, promotional, and administrative positions. Hiring may involve obtaining new personnel, transferring personnel from refuse to recovery activities, adding recovery-related duties to the ongoing refuse-related duties of existing personnel, or a combination of all of the above. Basic hiring activities include filling out the necessary federal government forms for employee payroll deductions and employer contributions, investigating union contracts, negotiating any necessary changes in job descriptions, and obtaining rates from the Workmen's Compensation Board.

Staff orientation is essential for initiating good personnel management, which should continue for the life of the program. If program administrators have not been part of the planning team, they should now become thoroughly familiar with the goals and procedures of the recovery program. Program labourers, especially "front line" collectors who represent the program in public, should be briefed about the significance of recovery, the importance of their role, and procedures to be followed. If these workers are to be transferred full-time or part-time from refuse operations, it is best to recruit those who are willing to make the transfer. Every effort must be made to minimize worker resentment of new duties and different equipment, possible rifts between refuse and recovery workers, and perceptions about job loss stemming from a lack of understanding of the program. These precautions will help avoid labour conflicts and help prevent a

decrease in labour productivity—important considerations, as wages are normally the largest single expense in a recovery program.

To obtain handling facility sites, should they be necessary, a search should be made of available refuse operation sites, existing warehouse sites, or sites suitable for new construction. Any new construction will have to conform to local building codes and by-laws. Building permits are required for even slight modifications of existing buildings. The building and contents will need to be insured.

Provincial environmental approvals and licences are not required when separated waste is being handled. However, any proposal involving the collection and composting of kitchen and yard wastes should first be discussed with the local regional office of the Ontario Ministry of the Environment.

Since winter weather could cause collection problems, residential source separation programs should not be started in winter. Spring and autumn are the preferred times of year for start-up.

## INITIATING A PUBLIC AWARENESS CAMPAIGN

High per-capita material recovery in a residential source separation program depends on residents in the program area being aware of, understanding, and having concern for the goals of the program. To achieve this end, an all-out effort is required to design and conduct as effective a publicity campaign as possible. The importance of publicity prior to and during start-up, and after the program is in operation, cannot be over-emphasized.

Given the wide diversity of community characteristics (e.g., size, location, availability of resources, and awareness of recycling benefits), there is no single format to be followed. A publicity campaign can range from posters, doorknob advertisements, and newspaper announcements to press conferences, school visits, and lengthy explanatory sessions with city officials and community groups. Promotional materials of a wide variety can be used to advertise the program: brochures, calendars, banners, displays, bumper-stickers, etc. A logo (and possibly a slogan) should be designed and used consistently on all publicity materials, publications, signs, trucks, etc.\*

The formation of a publicity education committee is advisable. This group should be formed well before the start-up date to develop initial and on-going strategies and to decide on the publicity tools to be used.

The three main strategies for promoting the program are:

1. direct communication with householders;
2. use of the mass media;
3. involvement of institutions and organizations.

Printed information should be distributed to all residents in the area of operation one to two weeks before program start-up. It is important to design an eye-catching leaflet that will not be confused with junk mail. Literature distribution will be most effective if there is simultaneous media coverage of the program.

Designating sites

Selecting season for start-up



Logo for pilot source separation programs sponsored by the Ontario Ministry of the Environment.

Publicity strategies

Direct communication with householders



Logo for Camp Borden source separation program.

\*See Appendix H for a sampling of publicity materials.

## Mass media communication

The usefulness of the mass media depends on the size and location of the community and the area of operation. In small, remote communities, or in small areas of operation within large communities, media coverage by major regional TV, radio, and press outlets may not be possible or appropriate. In such areas, local newspapers or regional newspapers with local inserts are usually more effective. Large areas of operation in large communities are suited to regional media promotion; however, these programs must compete with many other newsmaking events and activities for media attention. In general, the press is the most effective vehicle for promoting a program, followed by radio, then TV.

To get media promotion under way, first contact assignment editors and reporters for details about media policies. Next, prepare a news release for distribution to media contacts and arrange a news conference to kick off the program. Phone follow-ups are essential in obtaining news coverage or media attendance at a news conference. Media coverage can also be sought well in advance of program start-up, if newsworthy events can be arranged. Media coverage should be particularly intensive when literature is being distributed to residents.

## Involvement of local institutions and organizations

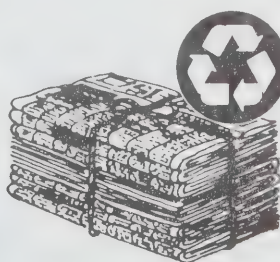
Approaches should be made to all institutions and organizations in the program area that might be ready to help promote the program. Information about the program could be announced at gatherings and through bulletins, of churches, schools, parent-teacher associations, ratepayers' associations, the Welcome Wagon, service clubs, horticultural societies, etc. The involvement of local groups is particularly effective in small communities.\*

## The basic information package

As an aid to all publicity activity, an information package should be developed to cover the following:

1. rationale for the program—i.e., its environmental and economic benefits (how the recycling of materials actually results in savings in energy, resources, pollution, and land);
2. starting date;
3. materials to be collected;
4. collection details (weekly schedule, time of day, where to put materials, how collection will be affected by bad weather and holidays);
5. householder preparation requirements (determined by buyer specifications, processing procedures at handling facilities, if any, and collection procedures);
6. name of program sponsor and phone number for obtaining information and reporting missed pick-ups.

Be sure that the actual program is able to live up to the billing it is given. The most vigorous promotion can be undermined by unreliable collection procedures—e.g., failure to maintain expected pick-up schedules due to labour or equipment problems.



**This  
Newspaper is  
Needed for  
Recycling**

'Somerville Saves' logo from Multimaterial Source Separation in Marblehead and Somerville, Massachusetts, U.S. EPA; newspaper recycling logo from Operating a Recycling Program: a Citizen's Guide, U.S. EPA (both publications listed in Appendix C).

\*See Appendix C for a listing of some recent educational and promotional materials that could be of value when promoting a program with local groups.

## STAGE FOUR: MAINTAINING AND IMPROVING THE PROGRAM

### SUSTAINING PUBLICITY

In order to maintain and increase participation (and thus materials recovery), publicity must be carried out on an ongoing basis after the program has been initiated. Continuing publicity should include both direct and mass media communication with residents and the ongoing involvement of institutions and organizations. Publicity materials for the continuing program should include many of the same promotional materials used during start-up. Once again, logos and slogans should be used in a consistent manner.



*“Recycling Is A Blast!”*



*“Recycling - It's Up To You!”*

Drawings from *Operating a Recycling Program: a Citizen's Guide*, U.S. EPA.

A reminder of the rationale for the program and the preparation procedures to be followed, plus an update on the tonnages of materials that have been collected and recycled, should be distributed to households shortly after start-up—i.e., one to two months later. Such information serves to re-enforce the need for the program with participating residents and helps to motivate those residents not yet participating. Updates and reminders should be repeated every six months by means of one or more of the following mechanisms:

- leaflets distributed by volunteers, refuse collection workers, or recovery collection workers;
- notices piggybacked with utility, phone, or tax bill mailings (requires the co-operation of companies and agencies that carry out mass mailings);
- the inclusion of information on civic calendars or in directories distributed in the area of operation;
- speeches, and other means of verbal endorsement, by influential people in the community.

Press media covering the general area of program operation should be asked to carry continuing reminders about the program and perhaps to provide a regular column. Radio stations should be provided with public service announcement scripts, and sympathetic announcers should be asked to “plug” the program. Radio and TV talk shows are natural vehicles for promoting the program. The mass media should be provided with “fresh angles” about the program as often as possible, including information on program data collection, expansion, and enlargement.

Local institutions and organizations should continue to be provided with program information that can be distributed through internal mailings and at meetings.

Mass media  
communication

Institutional  
support

## ENLARGING THE AREA OF OPERATION

Once the initial program is established and streamlined, consideration can be given to enlarging the area of operation. **Enlarging the program** from a pilot area to the wider community, or from one community to several communities, **usually results in higher recovery** (and therefore increased disposal diversion) **for proportionately less effort**. Other advantages of expansion include better utilization of mechanical equipment, heightened public confidence, increased buyer interest, and greater opportunities for mass media promotion.

Before the area of operation is enlarged, all of the steps from Stages One, Two and Three should be repeated. Careful planning is important in order to prevent the increased costs being incurred through area enlargement from exceeding the increased revenue. In addition: the capacity of initially borrowed labour and improvised equipment could be outstripped; a handling facility might need to be established in order to deal efficiently with higher recovery; an additional layer of administration could be needed to co-ordinate the larger operation.

## EXPANDING TO OTHER WASTE SOURCES

After the initial program has been operating effectively for a period of time and has perhaps been enlarged, consideration can be given to expanding from residential to commercial, institutional, and/or industrial sources. Waste materials, particularly worth considering from other sources, are high-grade paper from office buildings,\* corrugated cardboard from stores and factories, and glass containers from restaurants, hotels, and institutions. Expansion of the program to incorporate other waste sources is a significant step and should not be undertaken without careful analysis of the probable implications of such a move on existing collection, handling, and transportation procedures.

## MONITORING THE PROGRAM

Once the program is in operation, it is necessary to keep records on costs, revenues, quantities of recyclable materials recovered, and degree of participation. These measures are essential for evaluating the efficiency and effectiveness of the program.

### Recording Costs

A system should be devised for recording expenses incurred in the following cost categories: capital, operating, maintenance, administration, and promotion.

Where possible, all costs should be converted to a dollar-cost per ton to provide an effective measure for evaluating the cost efficiency of the program. Costs for truck depreciation, truck repair, gasoline, and other non-labour components must be calculated periodically and applied to the number of tons collected in order to derive a dollar-cost per ton. The conversion of labour costs to a dollar-cost per ton (i.e., the number of man-hours per ton times the local hourly wage rate) is particularly important for evaluating collection and processing operations, which have a high labour content.

The following is a sample format for recording labour collection costs:

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*\*For information on paper recovery from office buildings, see **Guidelines for implementing an office waste paper recovery program**, March 1979, Waste Management Advisory Board (listed in Appendix C).*

### Sample Format for Recording Labour Collection Costs (with hypothetical figures)

Procedures	Number of men	Number of minutes	Total minutes	Total man-hours (total minutes ÷ 60)	Tons
Transit time from garage to start of collection	2	12	24	—	—
Pure collection time	2	65	130	—	—
Coffee break	2	15	30	—	—
Pure collection time	3	55	165	—	.9
Transit time to point of storage or buyer	3	17	51	—	—
Other	—	—	—	—	—
Totals		164	400	6.7	.9

From the above figures:  
 — collection manhours/tons = 6.7 ÷ .9 = 7.4.  
 — collection cost per ton = 7.4 x \$4.75 (local hourly wage rate, including fringe benefits) = \$35.15.

### Recording Recovery and Revenues

The format below is one method for recording tonnages recovered and revenues received. Data presented in this manner show fluctuations in tonnages and revenues received and enable comparisons to be made of initial projections with actual achievements, or with data available from other groups.

### Sample Format for Recording Monthly Revenue/Recovery (with hypothetical figures)

Week or Month	Paper			Glass			Cans			Total tons	Total Revenue
	tons	price/ton	rev. \$	tons	price/ton	rev. \$	tons	price/ton	rev. \$		
Jan.											
Feb.	20	40	800	12	20	240	3	8	24	35	1064
Mar.											
etc.											
Total											

### Calculating Net Revenues

Once both costs and revenues have been established, a calculation of net revenue is possible. A simple format for this purpose is shown below. Cost-savings and grants/or subsidies should also be recorded when and where appropriate.

### Sample Format for Recording Costs, Revenues, Cost savings, & Grants (with hypothetical figures)

Month	Costs*		Revenues	Net Revenue(±)		Cost savings	Grants & Subsidies
	Full	Direct		Full	Direct		
January	525.00	300.00	paper \$800 glass \$240	539(+)	764(+)		
February						30 tons diverted to date. Savings in access fee of \$90.	
March							\$1,000. federal grant

*\*Costs and cost additions may be subtracted from revenues and cost-savings to produce a net numerical representation of the advantages or disadvantages associated with the source separation program.*

## Monitoring

Monitoring the program may include: 1) counting the number of set-outs, 2) listing addresses at which set-outs are counted, 3) querying drop-off patrons, 4) inspecting collected material for contamination. Monitoring properly carried out and repeated over a period of time can allow: 1) calculation of cumulative and average weekly participation, 2) average set-out size, 3) frequency of participation. All of these measures are useful for making adjustments to the operating system and/or improving the promotional strategy.\*

## Calculating Recovery Rates and Diverted Disposal Rate

Once the required data has been collected, it is both possible and useful to calculate recovery rates for the individual materials being separated and the diverted disposal rate.

### Recovery rates

The recovery rate is the quantity of a material recovered as a proportion of the total amount of that material available. The recovery rate for a given material can be calculated by dividing actual tonnage recovered by total available and then multiplying by 100. For example: if 24 tons of newspapers were recovered in a given period out of a total available tonnage of 40 tons, the recovery rate for newspapers would be  $(24 \div 40) \times 100 = 60$  per cent. The calculation of recovery rates is useful as an indicator of program effectiveness and permits a comparison with recovery rates in other programs.

### Diverted disposal rate

The diverted disposal rate is the quantity of material removed from the waste stream as a proportion of the total amount of waste generated. The diverted disposal rate may be calculated by dividing the actual tonnage of materials recovered by the total amount of residential solid waste in the area and then multiplying by 100. For example, if 60 tons of materials were recovered in one month out of a total tonnage of 250 tons, the diverted disposal rate would be  $(60 \div 250) \times 100 = 24$  per cent. The diverted disposal rate indicates the effectiveness of the program in diverting waste from landfill.



"Monday... rubber and plastics! Tuesday... glass! Wednesday... grass and leaves! Thursday... tin cans! Friday... wood! Garbage, we don't take anymore!"

\*For detailed information on how monitoring can be carried out for curbside programs, see *At Source Recovery of Waste Materials* from C.F.B. Borden: *The Viability of At Source Recovery in Small Communities*, Vol. III, the *Public Participation Program*, 1979, Environment Canada (listed in Appendix C). This report also describes and evaluates an ongoing publicity campaign.

## Appendix A: BUYERS OF RECOVERED MATERIALS

### General

The Recycling Council of Ontario approaches buyers, sells materials, provides information and advice, and performs accounting functions for its membership (municipalities and community based recycling enterprises). Address: 477 Dupont St., TORONTO, Ontario M6G 1Y6

**Recoup: Canada's Secondary Materials Market** is a semi-monthly periodical listing prices and buyers. Address: Venture Publications Limited, 223A McLeod St., OTTAWA, Ontario K2P 0Z8

### Glass buyers

**Consumers Glass Co. Ltd.**, 777 Kipling Ave., TORONTO, Ontario M8Z 5G6 (Has upgrading facilities for cap and ring removal.)

**Consumers Glass Co. Ltd.**, 100 Chisholm Drive, MILTON, Ontario L9P 3G9

**Consumers Glass Co. Ltd.**, 85 Montcalm Blvd. N. CANDIAC, Quebec J5R 3L6

**Consumers Glass Co. Ltd.**, 258 Second Ave., VILLE ST. PIERRE, Quebec H8R 1M1

**Domglas Inc.**, 100 West Drive, BRAMALEA, Ontario L6T 2J5 (Upgrading facilities are planned for the future.)

**Domglas Inc.**, Chapple St., HAMILTON, Ontario L8L 7Y7

**Domglas Inc.**, 1250 James St., WALLACEBURG, Ontario N8A 4L8

**Domglas Inc.**, 2376 Wellington St., PTE. ST. CHARLES, Quebec H3K 1X6

### Can buyers

**Metal Recovery Industries Ltd.**, 670 Strathearn Ave. N., HAMILTON, Ontario L8H 7N7

Also, look under 'Scrap Metal Dealers' in the Yellow Pages.

### Waste paper dealers and brokers active in Ontario\*

**Abitibi-Price Fine Papers**, Toronto-Dominion Centre, P.O. Box 21, TORONTO, Ontario M5K 1B3

**Axler Waste Control Systems Inc.**, 16 Rimini Mews, Unit B, MISSISSAUGA, Ontario L5M 1L7

**I.R. Bell & Son**, 840 Amelia Street, CORNWALL, Ontario K6H 3R6

**Bulk Steel & Salvage Ltd.**, R.R. #2, #6 Hwy. North, HAMILTON, Ontario L8N 2Z7

**Buscombe & Dodds Paper Stock Ltd.**, 255 Wellington St. W., TORONTO, Ontario M5V 1E1

**Cambridge Recycling**, 54 Cedar St., CAMBRIDGE, Ontario N1S 1V3

**Canadian Iron & Metal Co.**, 94 Cannon Street W., HAMILTON, Ontario L8R 2B6

**I. Cohen & Co. Ltd.**, P.O. Box 290, KINGSTON, Ont. K7L 4V8

**Consolidated Fibres of Ontario Limited**, 95 Commissioners St., TORONTO, Ontario M5A 1A6

**Data Surplus Cards Ltd.**, 1860 Shawson Dr., MISSISSAUGA, Ontario L4W 1R7

**Dominion Recycling Company Limited**, 1860 Shawson Dr., MISSISSAUGA, Ontario L4W 1R7

**Domtar Packaging, Recycling Operation**, 451 Front St. E., TORONTO, Ontario M5A 1G9

**Falls Iron and Metal**, P.O. Box 71, SMITHS FALLS, Ontario K7A 4S9

**F. Fiore & Son Ltd.**, 5731 Stanley Ave., NIAGARA FALLS, Ontario L2G 3X6

**Florence Paper Company Ltd.**, 2475 Sheffield Rd., OTTAWA, Ontario K1B 3V6

**Genor Services**, 401 Elgin St., BRANTFORD, Ontario N3T 5W5

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\*Although comprehensive, this list is not complete. For additional listings, consult the Yellow Pages under 'Waste Paper.'

#### Mills using waste paper

Gold & Gold Recycling Industries Inc., 555 Bathurst St., LONDON, Ontario N6B 1P6

Hanna Paper Fibres Ltd., 2750 John St., MARKHAM, Ontario L3R 2W4

Joseph & Company Limited, 257 Victoria St. N., KITCHENER, Ontario N2H 5C9

Kingston Iron & Metal, Div. Kimco Steel Sales Limited, P.O. Box 300, 325 Counter St., KINGSTON, Ontario K7L 4W1

Elliot Krever & Associates Limited, Suite 105, 150 Consumers Road, WILLOWDALE, Ontario M2J 1P9

The Levis' Paper Fibres Ltd., 199 Eastern Ave., TORONTO, Ontario M5A 1H7

Mill Paper Fibres Limited, 162 Ferguson Ave. N., HAMILTON, Ontario L8L 4V4

Mill Paper Fibres Limited, 20 Trinity St., TORONTO, Ontario M5A 3C5

Renfrew County Recycling Ltd., P.O. Box 65, PEMBROKE, Ontario K8A 6X1

Rosen Metal Co. Ltd., 61 Balzer Road, P.O. Box 188, KITCHENER, Ontario N2J 3Z9

Sonoco Ltd., 33 Park Ave., BRANTFORD, Ontario N3S 2Z4

Textile & Paper Waste Sales Ltd., 116 George St., TORONTO, Ontario M5A 2M5

Welland Iron & Metal Co. Ltd. (Ennisteel), P.O. Box 10, PORT ROBINSON, Ontario L0S 1K0

Abitibi-Price Inc., Iroquois Falls Division, Box 550, IROQUOIS FALLS, Ontario P0K 1E0

Abitibi-Price Fine Papers, Box 1046, THOROLD, Ontario L2V 3Z7

Atlantic Packaging Products Ltd., 111 Progress Ave., SCARBOROUGH, Ontario M1P 2Y9

Beaver Wood Fibre Co. Ltd., THOROLD, Ontario L2V 3Z8

Continental Group of Canada Ltd., 495 Commissioners St., TORONTO, Ontario M4H 1A5

E. B. Eddy Forest Products Ltd., HULL, Quebec

Domtar Fine Papers Ltd., 800 2nd St. W., CORNWALL, Ont. K6H 5S3

Domtar Fine Papers Ltd., Don Valley Mill, TORONTO, Ontario M4J 4Y4

Domtar Fine Papers Ltd., 343 Glendale Ave., ST. CATHARINES, Ont. L2T 2L9

Domtar Packaging, 747 Bramalea Road, MISSISSAUGA, Ontario L5S 1C4

Domtar Packaging, Box 807, TRENTON, Ontario K8V 5R8

Domtar Construction Materials, CORNWALL, Ontario

Domtar Construction Materials, Box 10, THOROLD, Ontario

IKO Industries, 71 Orenda Road, BRAMPTON, Ontario L4W 1V8

Kimberly-Clark of Canada Limited, 45 Merritt St., ST. CATHARINES, Ontario L2T 1J4

The Ontario Paper Co. Limited, THOROLD, Ontario L2V 3Z5\*

Sonoco Ltd., Box 1208, 33 Park Ave. E., BRANTFORD, Ontario N3T 5T5

Strathcona Paper Company, Box 130, NAPANEE, Ontario K7R 3L6

Trent Valley Paperboard Mills, Box 821, TRENTON, Ontario K8V 5R8

\*At time of writing, Ontario Paper was building a newsprint deinking plant with a projected capacity of 100,000 tons of newspapers per year.

## Appendix B: LOCATING EQUIPMENT AND VEHICLES

The major types of source separation handling equipment and vehicles are listed below with approximate price ranges and Yellow Pages listings (YPL) under which suppliers may be found.

**Baling Equipment** (\$8,300-\$50,000, excluding feed system). YPL: Baling Equipment & Supplies

**Conveying Equipment** (\$110-\$155 per linear foot). YPL: Conveyors, Baling Equipment & Supplies

**Hammer Mills for Crushing/Shredding Glass/Metal** (\$1,000-\$150,000, depending on capacity and number of accessories, excluding feed system) YPL: Crushing, Pulverizing & Shredding Equipment

**Shredders, Hoggers, Air Delivery Systems** (\$5,000-\$40,000+). YPL: Baling Equipment & Supplies; Paper Shredding Machines

**Confidential Shredding Equipment** (\$300-\$3,000 for office shredders; \$5,000-\$11,000 for commercial shredders; see above for industrial shredders). YPL: Paper Shredding Machines

**Trucks—Warehousing** (\$200-\$24,000). YPL: Trucks—Industrial

**Front-End Bucket Loaders** (\$10,000-\$18,000). YPL: Contractors' Equipment & Supplies

**Roll-Off/Bulk-Lift Containers** (\$1,600-\$3,300). YPL: Rubbish Removal Contractors' Equipment

**Barrels & Drums** (for small containers)

**Cartage & Express** (for transport truck and driver service, back-haul; back-haulers can also be found through businesses that receive shipments via cartage)

**Pallets & Skids** (for pallets, which can also be used for making pallet boxes)

**Railroads** (for railhaul)

**Rubbish Removal** (for bulk-lift containers and lift-service, packer trucks)

**Truck Bodies** (for hydraulic tail gates, collection/transport truck purchase)

**Truck Dealers** (for collection/transport truck purchases)

**Truck Driver Leasing** (for qualified drivers, part-time or permanent)

**Truck Equipment & Parts** (for hydraulic tail gates)

**Truck Renting & Leasing** (for collection/transport truck rent)

**Trucks—Industrial** (for fork-lift vehicles)

**Trucks—Industrial—Parts & Supplies**

**Trucks—Industrial—Renting**

## Appendix C: SOURCES OF GENERAL INFORMATION

The following governmental agencies and private associations are involved with source separation in various ways. Publications and other informational materials available from them (such as those listed here) may be useful to operators of existing and proposed source separation programs.

**Department of Energy, Mines & Resources Canada**, Conservation & Renewable Energy Branch, Sir William Logan Building, 580 Booth Street, OTTAWA, Ontario, K1A 0E4

**Environment Canada**, Waste Management Branch, Environmental Impact Control Directorate, Environmental Protection Service, Place Vincent Massey, HULL, Quebec, K1A 1C8

Other Yellow Pages  
classifications

Governmental  
agencies

- Procedures for the Recovery of Waste Newspaper from a Small Urban Community, prepared by S.P.A.R. Systems, 1978
- Environment Canada, Environmental Protection Service (Ontario Region), 25 St. Clair Avenue East, 7th Floor, TORONTO, Ontario M4T 1M2
- A Multimaterial At Source Collection Vehicle— Design and Evaluation, prepared by The Is Five Foundation, 1980
- Implementation of At Source Separation Systems in Canada: An Initial Evaluation of the Potential Impacts, prepared by Enertask Consultants & Resource Integration Systems Ltd. (soon to be released)
- At Source Recovery of Waste Materials from C.F.B. Borden: The Viability of At Source Recovery in Small Communities, prepared by Resource Integration Systems, 1979
- Executive Summary
- Volume I— (General Description)
- Volume II— The High Grade Paper Recovery Program
- Volume III— The Public Participation Program
- Ontario Waste Management Advisory Board, One St. Clair Avenue West, 6th Floor, TORONTO, Ontario, M4V 1K6
- Municipal Solid Waste Management Cost Control Reporting Manual (Section IV F: Source Separation), prepared by Currie, Coopers & Lybrand Ltd., 1978
- Assessment of Significant Existing and Proposed Residential Source Separation Programs: A State of the Art Study, prepared by Jo Ann Opperman, 1979
- An Evaluation of Handling Stations in Waste Reclamation Systems, prepared by Resource Integration Systems Ltd., 1979
- Guidelines for implementing an office waste paper recovery program, 1979
- Newspaper Recovery Within the Residential Sector: An Analysis of Three Programs, prepared by Michael Berkowitz, 1979
- Glass Recovery by Source Separation (City of Kanata), prepared by Peat Marwick & Partners, 1980
- Ontario Ministry of the Environment, Waste Management Branch, 135 St. Clair Avenue West, 2nd Floor, TORONTO, Ontario M4V 1P5
- Source Separation, A Report on the Divide and Conquer Projects, (soon to be published)
- Ontario Ministry of the Environment, Information Services Branch, 135 St. Clair Avenue West, 6th Floor, TORONTO, Ontario, M4V 1P5
- A Citizen's Handbook on Waste Management and Recycling, 1979
- Divide and Conquer. A Teacher's Guide to Waste Management, Grades 4-6 and Grades 7-10, 1980
- A Matter of Common Sense, a film available from Modern Talking Pictures, 143 Sparks Ave., WILLOWDALE, Ontario, M2H 2S5
- United States Environmental Protection Agency, Office of Solid Waste, 26 West St. Clair Street, CINCINNATI, Ohio, 45268
- Operating a Recycling Program: A Citizen's Guide, SW-770, 1979
- A National Survey of Separate Collection Programs, SW-776, 1979
- Source Separation, Collection and Processing Equipment, A User's Guide
- Multimaterial Source Separation in Marblehead and Somerville, Massachusetts, SW-842, 1980
- I. Community Awareness Programs in Marblehead and Somerville
  - II. Collection and Marketing
  - III. Composition and Source Separated Materials and Refuse
  - IV. Energy Use and Savings from Source Separated Materials
  - V. Citizen Attitudes Toward Source Separation

## Associations

California Solid Waste Management Board, Resources Agency, 1020 Ninth Street, SACRAMENTO, California, 95814

How to start a recycling center, 1979

Canadian Association of Recycling Industries, 5799 Yonge Street, Suite 1101, WILLOWDALE, Ontario, M2M 3V3

Canadian Pulp and Paper Association, 2300 Sun Life Building, MONTREAL, Quebec, H3B 2X9

Glass Container Council of Canada, 67 Yonge Street, Suite 1310, TORONTO, Ontario, M5E 1J8

Metal Container Manufacturers' Advisory Council, Suite 708, Essex House, 185 Bay Street, TORONTO, Ontario, M5J 1K6

Recycling Council of Ontario, 477 Dupont Street, TORONTO, Ontario, M6G 1Y6

## Posters

Posters, with such titles as Great Garbage Machine!, Why Recycle?, Recycling Is for Everyone!, Garbage Is What You Throw Away!, are available from: Transition Graphics, P.O. Box 30007, Eugene, Oregon, U.S.A., 97403

## Appendix D: ESTIMATING QUANTITIES OF RECYCLABLE MATERIAL AVAILABLE FOR RECOVERY

### Waste Sampling

The analysis of residential waste involves 1) selecting an adequate sample size, 2) undertaking random sampling, and 3) extrapolating from the sample to the program area. As the degree of waste generation in a given area fluctuates widely from week to week and month to month (depending on factors such as vacation days and time of year), advice on the preferred times and methods for carrying out the analysis should be sought from the public agency or private company responsible for municipal refuse collection. It is to be noted that, at best, the process will yield only approximate indications of recyclable material quantities available for recovery.

Residential waste to be analyzed for composition purposes can be obtained from vehicles delivering refuse to landfill sites or transfer stations, or from household refuse containers set out at curbside for collection. The process (for vehicles) involves: 1) sorting the contents from a pre-determined number of vehicles into refuse and recyclable material types; 2) weighing each of the categories; 3) multiplying the sample weights by the average number of vehicles per week delivering residential waste. The results provide estimates per week of total waste generation and quantities of recyclable materials available for recovery.

The validity of sampling delivery vehicles at disposal sites or transfer stations depends on whether the exact origin of vehicles is known.

If vehicles contain any non-residential waste, results will not be accurate for residential waste analysis. In such an instance, the curbside sampling of household refuse containers (in the same basic manner, as above) yields more accurate results.

### Estimating Potential Newspaper Recovery from Production/Consumption Data

The figure being sought is the total weight of newspaper available in the program area for recycling. To get this figure, there are four basic steps:

1. Contact local and regional newspaper publishers to get average circulation figures on a daily, weekly, or monthly basis, as applicable (including both subscription and street-corner sales); the average number of pages per issue; the weight per page of each newspaper. (Weight-per-page can be calculated by weighing the newspaper on an accurate scale and dividing the result by the number of pages in that issue. Note that there are several different sizes for both tabloid and "regular" newspapers.)
2. For each newspaper, calculate the total weight sold in the program area per year. (Average circulation x frequency of publication per year x average number of pages per issue x weight per page = weight per year.)
3. Adjust this figure by an estimate of the outflow of newspapers received at home but thrown away at work, and the inflow of papers bought outside the program area and carried home.
4. Reduce this total by an estimate of the amount burned in stoves or fireplaces by local residents, or used for wrapping wet garbage, or otherwise made unsuitable for recycling.

For purposes of comparison, see Table D.1 for the average weight per issue of some newspapers.

**TABLE D.1**  
Some Newspaper Weights

Newspaper	Avg. No. of Pages	Weight/Issue (pounds)
Toronto Star		
(Weekly & Sun.)	68	.84906
(Saturday)	250	3.12152
Globe and Mail	52.44	.68754
Toronto Sun	84	.44644
Financial Post	60	.76250
Financial Times	40	.28962

For a detailed study of newspaper flows in three residential areas, see *Newspaper Recovery Within the Residential Sector: An Analysis of Three Programs*, Waste Management Advisory Board, January 1979 (listed in Appendix C).

## Appendix E:   BALING AND HANDLING OF NEWSPAPERS

### Primary baling equipment

There are three basic types of balers: downstroke, upstroke, horizontal. Downstroke balers are not capable of producing mill-size bales (72" or 182 cm), nor is their capacity, which cannot exceed 1/2 ton/hour, generally large enough for a handling facility. Conventional upstroke and horizontal balers can bale one to two tons of newspaper per hour. A large upstroke baler utilizing a pit (i.e., a pit baler) is capable of baling more than 20 tons of newspaper per hour. Horizontal balers must be supplemented with shredding or hogging equipment for cutting the paper into small pieces.

### Related baling equipment

Either mechanical belt-drive or air delivery conveyors can be used to feed shredded/hogged material into balers. Only the belt-drive type would be useful for feeding whole newspapers into shredders/hoggers. An open-belt conveyor allows baler system operators to remove contaminants during initial in-feed. Easy access to a shut-off button allows operators to stop the system. A fork-lift truck is required for removing bales from a baler and for stacking bales. Finished bales cannot be moved manually, and hand trucks are generally unsuitable for such work.



### Space requirements

Processing space requirements depend on the type of baler chosen, whether shredding/hogging equipment is employed, and warehousing procedures. Space for a horizontal baler and related activities could total 166 sq. yds. (139 sq. metres); for an upstroke baler and related activities, 89 sq. yds. (75 sq. metres), including a pit about 4.3 yds. (3.6 metres) deep.

For shipment in 20-ton tractor-trailer loads, a minimum of 44 sq. yds. (37 sq. metres) of space should be allowed for storing baled newspaper. This allowance can be decreased if bales are to be stacked more than 2.6 yds. (2.4 metres) high. Storage of baled newspaper requires a dry, enclosed or sheltered area.

### Labour requirements

Baler-system labour requirements vary with the number of hours per week necessary to process and warehouse the quantity of newspaper recovered. At minimum, one person will be required to remove contaminants during in-feed and to transfer bales to storage. About one hour of staff and fork-lift time is required to load 20 tons of baled newspaper into a trailer. This method of loading requires at least one truck-level loading dock in the handling facility.

## Appendix F: THE DEPOT SYSTEM

Depot functions include the receiving, temporary storage, and shipping of one or more materials (e.g., newspapers, mixed papers, glass containers, cans) to a handling facility or directly to end-use buyers.

Designing a depot system involves decisions about the number, location, and physical design of the depots themselves and of the labour and vehicle requirements for servicing the depots. There are two basic models:

1. the unstaffed depot with open access and unlimited hours of operation;
2. the staffed depot with access during limited hours of operation.



Delivering materials to unstaffed and staffed depots.

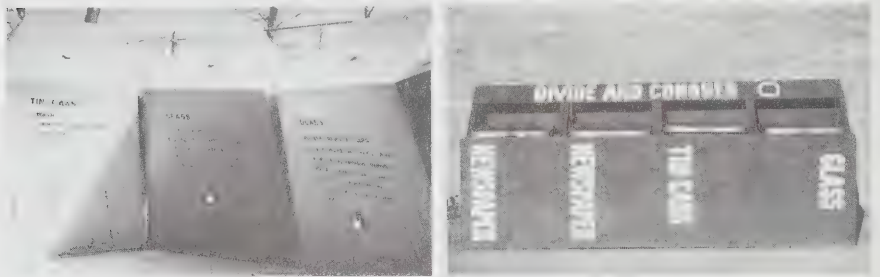
The staffed depot often encompasses additional activities to the unstaffed depot, such as: the receipt of reusable items (e.g., egg cartons, paper bags, appliances, refillable bottles); a waste exchange or re-sale store; a compost farm. The presence of staff eliminates much of the potential for contamination of materials delivered by individuals.

The geographical boundaries of a depot system are irregular, as they are largely defined by the residents who participate in the program.

## Location

A convenient location is the most important factor in planning a depot system. Often frequented commercial locations (e.g., supermarket and plaza parking lots) are ideal for unstaffed depots, as they tend to maximize participation and minimize automobile energy consumption. Staffed depots may have to be set up in less convenient locations because of their greater space requirements.

When arranging for depot locations with commercial-site owners/managers: show a drawing of layout and space requirements; have a maintenance plan worked out; be prepared to discuss liability for damage and personal injury. Since “recycling” has good public relations value for site owners, locations are usually donated for unstaffed depots. “Free” space is not as readily available for larger staffed depots.



Unstaffed depots in the City of Toronto (left) and Aurora (right).

## Space requirements

At each depot site, space must be allocated for the unloading of materials from cars and other vehicles, the placement of storage containers, and the loading of collection vehicles. If employed, bulk-lift vehicles will require generous loading height clearances and adequate manoeuvring room.

## Storage and equipment requirements

Storage and equipment requirements vary according to the number and types of materials to be received—e.g., glass containers, cans, newspapers, mixed papers. If colour-separated glass is to be collected, (i.e., clear, green, amber), then three containers will be required for glass alone. The capacity of each container, or the number of duplicate containers for the same material, will depend on projected recovery and the interval of service. Containers used within a depot network serviced on a “milk-run” basis should be standardized.

## Protection of materials

Materials need protection from precipitation. Wet newspapers are not acceptable to most buyers; containers filled with glass or cans may be impossible to move if also full of frozen water. Protection can be achieved by providing covers for the containers, or by constructing either a shelter over the containers or an enclosed structure for the entire operation.

## Maintenance

Maintenance at depot sites, where litter and possibly vandalism can be expected, is most important. A refuse container for empty bags and boxes is a necessity, as is the regular sweeping of broken glass and other litter.

## Servicing requirements

The general servicing requirements for a depot system are determined by the number of depot sites, the number of containers serviced, container capacity, and projected recovery.

Depot containers and service vehicles that remove materials must be compatible. The most efficient approach is one in which materials

are deposited into front-loading or rear-loading vehicles, or into roll-off containers that are loaded onto bulk-lift vehicles. Such vehicles are often available from municipal or private refuse collection operations.

Vehicles with hydraulic tailgates can also be used for servicing depots. These vehicles are particularly suited to collecting materials stored in removable bins on castors, which allow full bins to be easily exchanged for empty ones. An advantage of the bin-exchange approach is that several materials can be collected from a depot at the same time without being mixed together. A disadvantage is that the vehicles used have less volume capacity than bulk-lift vehicles.



Wheel-equipped depot containers being picked up by truck with hydraulic tailgate in Aurora.

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## Appendix G: SOURCE SEPARATION IN APARTMENT BUILDINGS

The existence of multiple-unit dwellings in an area of residential source separation raises the question of how apartment residents can become involved in the program. In general, a depot approach, modified to suit particular circumstances, is the most appropriate solution. A curbside approach, in which apartment residents set recyclable materials out at the curb for separate collection in the same manner as single-family-dwelling residents, is only recommended for very small apartment buildings.

In most apartment buildings, residents deposit their refuse down chutes that feed into compactors and/or containers that are periodically removed by municipal or private haulers. In such instances, buildings/complexes can be provided with appropriate containers, located indoors or outdoors, into which residents can deposit separated materials. Ideally, containers should be located for the maximum convenience of both residents and service vehicles.

In some apartment buildings, newspapers and glass containers are not allowed down chutes because of potential clogging problems. Residents in such buildings generally stack newspapers and glass containers on the floor of refuse chute rooms, and cleaning staff transfer the stacked material to central refuse locations. These circumstances are ideal for source separation, as cleaning staff can easily transfer separated materials to depot containers for pick-up.

**The co-operation of superintendents and management companies is essential to the initial undertaking and successful maintenance of a source separation program in an apartment building. Heavy initial and on-going publicity by means of leaflets, posters, etc., is also necessary to encourage and sustain resident participation and high levels of recovery. Because of higher population density, material collection costs per ton are usually lower for apartment building depot programs than for conventional residential curbside programs.**

# Appendix H: SAMPLE PUBLICITY MATERIALS

## Publicity Materials Used in Divide and Conquer Recycling Programs

The following materials were developed for use within pilot source separation programs sponsored by the Ontario Ministry of the Environment in conjunction with the cities of Aurora, Georgetown, and Toronto, and the Borough of Etobicoke (Metropolitan Toronto). Newspapers, glass containers, and cans were recovered in all four programs. A depot system was used in Aurora; a curbside system in Georgetown, Toronto, and Etobicoke.

Front and reverse sides of initial promotional pamphlet; original size, 8 1/2" x 7 3/8"



# RECYCLING BEGINS AT HOME.

## DIVIDE AND CONQUER.

Paste it up in your kitchen.

Stick it on your fridge. Over the sink or stove. Put it anywhere to remind you how to win the battle against garbage.

You see, our community could continue to fill up holes in the ground with our garbage and cover it over and forget it.

But that's a waste. We're burying a lot of resources that could be reused.

That's why there's not a moment to lose.

Our community can start reusing its garbage.

Right now.

## HERE'S HOW TO DIVIDE AND CONQUER.

1. When you're through with bottles, cans and newspapers (no magazines, please), put them in separate containers.

Containers to USE: Cardboard boxes, plastic shopping bags, paper bags, garbage cans and anything that isn't sealed. Containers NOT to USE: Anything that is sealed, such as garbage bags.

2. Rinse bottles and cans first. (Please leave bottle tops off.) Put bottle tops and can lids in the "CANS" container.

3. Put everything out on collection day. That's all there is to it!

## DIVIDE AND CONQUER. NOW.

The first collection for your area will be next week.

So do your part.

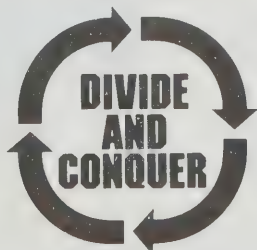
Think of it this way. You and your neighbours can help our community reclaim some of Canada's precious reusable natural resources.

Or you can let them be lost forever, buried in some hole somewhere.

For more information about any part of the program phone: 877-5185.

**PUT EVERYTHING OUT  
ON COLLECTION DAY.**

THE BATTLE AGAINST WASTE HAS BEGUN. JOIN IN.



A MESSAGE  
FROM THE  
MINISTRY OF  
THE ENVIRONMENT  
AND YOUR LOCAL  
MUNICIPALITY

PRINTED ON RECYCLED PAPER

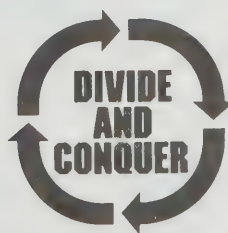
**THE  
FIGHT  
IS ABOUT  
TO BEGIN  
AND WE'D  
LIKE YOU  
TO TAKE  
PART.**

Front and reverse  
sides of initial  
promotional  
pamphlet;  
original size,  
4  $\frac{5}{8}$ " x 10  $\frac{1}{2}$ "

# **NEXT WEEK, YOU AND YOUR NEIGHBOURS GO INTO ACTION AGAINST THE ENEMY.**

The enemy is right in your home.  
In every home in your neighbourhood.  
It assumes many shapes.  
And one day soon, it could get out of hand.  
So there's little time to lose.  
We're not asking for your money. Not a penny.  
We're just asking you and your friends for a  
little of your time and effort.  
It's for the good of your children. Your family.  
Your community.  
In a few days you will receive instructions  
about how to stop the enemy in its tracks.

**WE'RE COUNTING ON YOU.**



A MESSAGE  
FROM THE  
MINISTRY OF  
THE ENVIRONMENT  
AND YOUR LOCAL  
MUNICIPALITY

PRINTED ON RECYCLED PAPER.

# YOU MIGHT HAVE THROWN THIS OUT 6 WEEKS AGO.

## RECYCLED

Doesn't look recycled, does it?

And that's the point.

The Divide and Conquer Recycling Program you started just 6 weeks ago is working.

Sorting out newspapers, bottles and cans from your everyday garbage is helping to conquer the garbage problem, and is helping to save many of our precious reusable natural resources.

But remember: We have only just begun to fight.

Victories against garbage aren't measured in months.

But in years.

So if you've become a bit lax about separating your garbage these last few weeks (or if you never really started) now is as good a time as any to begin.

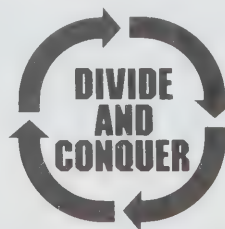
### HOW TO DIVIDE AND CONQUER.

1. When you're through with bottles, cans and newspapers (no magazines, please), put them in separate containers.  
Containers to USE: Cardboard boxes, plastic shopping bags, paper bags, garbage cans and anything that isn't sealed.  
Containers NOT to USE: Anything that is sealed, such as garbage bags.
2. Rinse bottles and cans first. (Please leave bottle tops off.)  
Put bottle tops and can lids in the "CANS" container.
3. Put out everything on collection day.

That's all there is to it!

For more information about any part of the program  
phone: 877-5185.

THE BATTLE AGAINST WASTE  
IS BEING WON BY PEOPLE LIKE YOU  
IT'S NEVER TOO LATE TO JOIN IN!



A MESSAGE  
FROM THE  
MINISTRY OF  
THE ENVIRONMENT  
AND YOUR LOCAL  
MUNICIPALITY

PRINTED ON RECYCLED PAPER.

Follow-up  
promotional  
pamphlet;  
original size,  
4 5/8" x 10 1/2"



# SPECIAL REPORT

A MESSAGE  
FROM THE  
MINISTRY OF  
THE ENVIRONMENT  
AND YOUR LOCAL  
MUNICIPALITY

## 90 TONNES OF NEWSPAPER, GLASS, METAL RECYCLED

The Divide and Conquer Source Separation Programme in your area is now one year old. The programme is to be continued.

To date, we have recycled 64,260 kgs of newspapers, 9,530 kgs of glass and 2,684 kgs of tin cans.

The City of Toronto and the Ministry of the Environment would like to extend their appreciation to all those who actively participated thus far in the programme. It is our desire to have full participation in the programme and we would like to ask each family that has not been placing these items out for collection during the past year to reconsider and to actively support this Source Separation Programme.

Please place your newspapers, glass and tin cans at the curbside by 7 a.m. each Wednesday. In the past we have retraced the collection route to pick up items that have been placed out too late in the day. This adds to the cost of the programme and must, of necessity, be discontinued.

In order to make this programme successful, the co-operation of every family in your area is solicited.

For more information about any part of the programme phone 367-7742.

IT'S NEVER TOO LATE TO JOIN IN!



# SPECIAL REPORT

A MESSAGE  
FROM THE  
MINISTRY OF  
THE ENVIRONMENT  
AND YOUR LOCAL  
MUNICIPALITY

## RECYCLING IN AURORA

The Divide and Conquer Recycling Program in Aurora is now over a year old. The program is to be continued with an improved service to you.

You have recycled over 250 tons of newspaper, glass and cans so far, but there have been a few problems.

Have you been to a recycling depot recently and found it too full to leave anything? We recognize this problem and are taking the following steps.

1. An additional depot will be located at Gateway Plaza.
2. Another depot added at the Aurora Shopping Centre.
3. One unit added at the I.G.A. Mall.
4. Two units added at the Aurora Community Centre.
5. Signs will be placed at each depot.

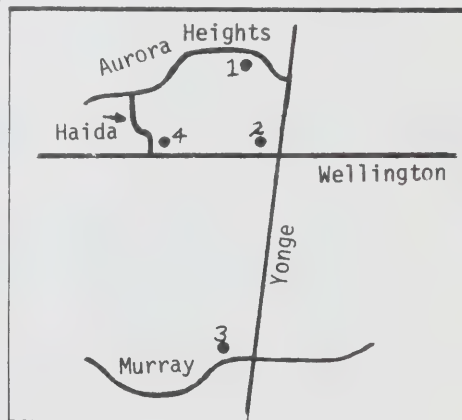
These additions doubled the depot system capacity.

We want everyone to participate in the program and ask each family that has not used a depot during the past year to reconsider and actively support the Recycling Program in Aurora.

Just following these simple steps and we will all benefit.

1. Save your used newspapers, bottles, jars and metal cans.
2. When you have a reasonable amount take the materials to the depot nearest you.
3. Deposit each material in the appropriate container.

DIVIDE AND CONQUER  
Recycling Depot Locations



1. Aurora Community Centre
2. I.G.A. Plaza
3. Aurora Shopping Centre
4. Gateway Plaza

**IT'S NEVER TOO LATE TO JOIN IN!**

FOR FURTHER INFORMATION: 727-1375

# Publicity Materials Used in Camp Borden Recycling Program

At Camp Borden, newspapers and glass containers are collected weekly from curbside.



Environment  
Canada

Environnement  
Canada

Environmental  
Protection

Protection de  
l'environnement

Your file    *Voire référence*

Our file    *Notre référence*

February 9, 1979

Dear Base Resident:

You have probably heard of the Base Borden Source Separation Study. One aspect of the Study is a regular pick-up of newspapers and glass from Base PMQ's every Friday starting at 8:00 a.m. The program is co-sponsored by DND and Environment Canada and has been operating since May 1978.

Within the next few days, you will be provided with a special container for storing and preparing your recyclable materials for collection. The container has two square units and one stacks upon the other. One unit is for glass storage and curbside use. The other unit is for newspaper storage and easy bundling.

The container will be left at your door on Wednesday, February 14th. If someone is home, our representatives will be glad to answer any questions you might have. If no one is home at the time of delivery, we hope you will feel free to phone (416) 533-6309 COLLECT, if you have any questions. This is a special number for container enquiries. Other questions about recycling pick-ups should be phoned to Huronia Recycling Association which operates the collection: (705) 737-4332, a Barrie number.

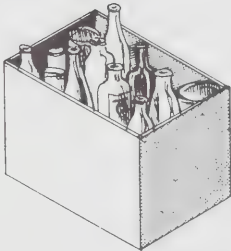
After you have had time to use the container, our representatives will be contacting you for some opinions about its usefulness, design and location. Separation of recyclable materials from garbage is an important conservation practice. Source separation saves valuable resources and keeps waste out of the Base landfill site. With these new containers, household recycling should be even more appealing to your family. Thank you in advance for your future co-operation.

Sincerely

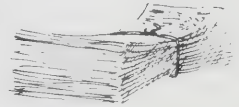
Richard Findlay, P. Eng.  
Environmental Engineering Division

Thank you for participating in the Base Borden Recycling Program. BUT for next week, please make the following changes when preparing your materials:

- \_\_\_\_\_ Bundle newspaper with twine (if bundling is not possible, stuff newspaper tightly into brown paper grocery bags). Do not use green garbage bags or boxes and do not put newspaper out loose.
- \_\_\_\_\_ Only newspaper is acceptable. Do not include any slick magazines, cardboard, boxes or plastic.
- \_\_\_\_\_ Rinse out green/brown/clear glass bottles and jars. Remove and throw away metal neck rings and caps. (Labels don't have to be removed.) Don't include any dishware, light bulbs, cookware, window panes or plastics.
- \_\_\_\_\_ Boxes, brown paper bags or pails may be used for setting out glass. But do not seal or close — the glass must be visible to the collection crew.



*CON*  
**WE SERVE**



For more information phone (705) 737-4332

Contamination/containerization notice card

## Publicity Materials Used in East York Recycling Program

In the Borough of East York (Metropolitan Toronto), newspapers, glass containers, cans, corrugated cardboard, and fine office papers are being recovered in various types of source separation programs.

Holiday collection schedule

### HOLIDAY COLLECTION SCHEDULE

Whenever there is a holiday during a week, we follow the municipal garbage collection schedule.

<u>Holiday</u>	<u>Regular Collection Day</u>	<u>Dates to be Collected</u>
Civic Holiday	Monday, Aug. 6 Tuesday, Aug. 7	Tuesday, Aug. 7 Wednesday, Aug. 8
Labour Day	Monday, Sept. 3 Tuesday, Sept. 4	Tuesday, Sept. 4 Wednesday, Sept. 5
Thanksgiving	Monday, Oct. 8 Tuesday, October 9	Tuesday, Oct. 9 Wednesday, Oct. 10
Christmas Week	There will be no pick up from December 24 to January 2 inclusive. Regular collection will resume on January 3, 1980.	
	Monday, Dec. 24 & 31 Tuesday, Dec. 25 & Jan. 1 Thursday, Dec. 27 Friday, Dec. 28	Monday, Jan. 7 Tuesday, Jan. 8 Thursday, Jan. 3 Friday, Jan. 4

# RECYCLING NEWS



THIRD  
EDITION

East York--Home Of Canada's Largest Community Recycling Program--Operated By The Is Five Foundation

## EAST YORK BECOMES CANADA'S MODEL RECYCLING COMMUNITY

The newspaper recycling program in East York is well into its second year. The success of the program is mostly due to the excellent participation of thousands of Borough residents. To date, more than 2,000 tons of newspapers have been recovered from the municipal waste in East York. We are currently collecting about 35 tons each week. That's 35 tons of material that is kept out of the landfill site every week.

By recycling our newspapers, we also help to conserve energy and resources. For example, more than 30,000 trees and thousands of barrels of oil were used to make the newspapers that have been recycled since the program started in February 1978. By collecting these papers and keeping them from being wasted, the residents of East York have helped to avoid the waste of more trees and oil.

We would like to take this opportunity to thank all those residents who have conscientiously participated in this program. We would also like to urge those residents who are not yet participating to help the community of East York become Canada's leader in conservation. It is easy to participate, and takes only a few minutes each week. The following guidelines will ensure that your papers will be properly collected for recycling.

- Bundle your newspapers with sturdy twine or cord. Please do not place newspapers in plastic bags, as they cannot be identified as recyclables by our crews, and are often picked up by the refuse collection crews. Newspapers and refuse are collected by separate trucks and crews, and therefore must be clearly distinguishable. Also, please do not put loose newspaper out for collection, since they can blow away and litter the neighbourhood.

*Continued on p. 2*



Πρόγραμμα 'Ανακύκλωσης 'Εφημερίδων για Κατοίκους του East York

Μή πετάτε τις παλιές εφημερίδες μαζί με τα καθημερινά σας σκουπίδια. Σας παρακαλούμε να δένετε τις παλιές εφημερίδες μ' ένα σπάγγο και να τις αφήνετε δίπλα στα άλλα σας σκουπίδια τη μέρα που έχουμε σημειώσει πάνω στο χάρτη στο κάτω μέρος αυτής της σελίδας. Οι εφημερίδες θα συλλέγονται χωριστά κάθε εβδομάδα. Στο δεματάκι σας βάλετε μόνο εφημερίδες, όχι περιοδικά με χαρτί γκλασέ, τηλεφωνικούς καταλόγους ή χαρτόνια. Τη μέρα της συλλογής των σκουπιδιών βγάλτε τις εφημερίδες στο πεζοδρόμιο πριν από τις 8:00 π.μ. 'Αν ο καιρός είναι βροχερός, κρατήστε τις εφημερίδες σας για την επόμενη ημερομηνία συλλογής γιατί οι βρεγμένες εφημερίδες δεν

μπορούν να ανακυκλωθούν. Αυτό το πρόγραμμα ανακύκλωσης υποστηρίζεται από τον Δήμο του East York.

### PROGRAMA DE REAPROVEITAMENTO CÍCLICO DE JORNAIS PARA OS RESIDENTES DE EAST YORK

Jornais velhos não se devem misturar com o seu lixo normal. É favor atar os seus jornais velhos com cordel e juntá-los ao seu lixo no dia indicado no mapa ao fim deste folheto. Os jornais serão levados à parte todas as semanas. É favor incluir só jornais e não revistas ilustradas, listas telefônicas ou papelão. Ponha os jornais na rua antes das 8:00 da manhã no dia da coleta. No caso de chuva, é favor deixar os jornais para a semana seguinte, pois que os jornais molhados não podem ser reaproveitados.

Este programa de reaproveitamento

cíclico é patrocinado pelo município de East York.

### PROGRAMMA DI RICICLOE' PER GLI ABITANTIE DI EAST YORK

I giornali vecchi non dovrebbero essere buttati nell'immondizia assieme agli altri rifiuti. Per favore legateli con un pezzo di spago e metteteli fuori vicino al vostro recipiente dell'immondizia (garbage can) il giorno indicato sulla mappa in fondo a questo volantino. I giornali saranno raccolti separatamente ogni settimana. Non includete riviste, guide telefoniche oppure pezzi di cartone, e' importante che si tratti solo di giornali vecchi. Qualora piovesse, si prega di mettere da parte il pacco dei giornali fino al prossimo giorno di raccolta che sarebbe la settimana successiva, in quanto e' impossibile effettuare l'operazione di riciclo se essi sono bagnati.

Questo programma di riciclo e' appoggiato dalla municipalita' di East York.

# Toronto Recycling Action Committee

For further information call TRAC  
367-7850

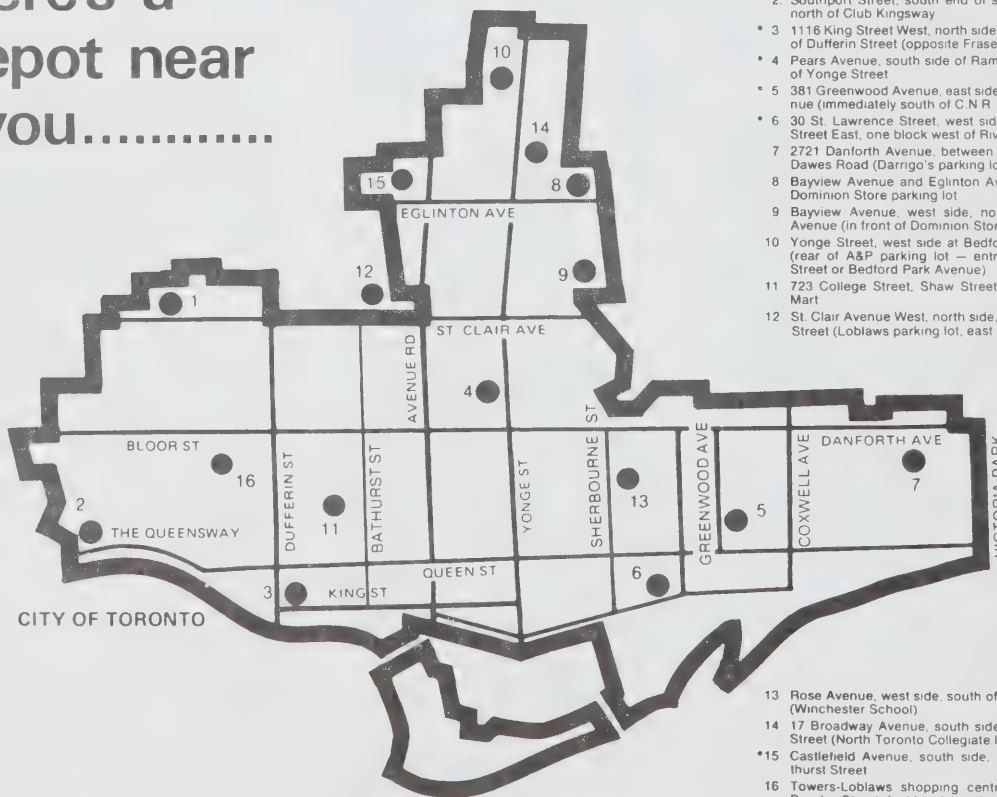
If your bundled papers are not picked up  
on Wednesday, call 367-7742.

## Brochure Circulated to City of Toronto Residents by Toronto Recycling Action Committee

In the ongoing city-wide Toronto program, newspapers are collected weekly from curbside; glass containers and cans must be delivered to depots.

Cover and  
depot map

There's a  
depot near  
you.....



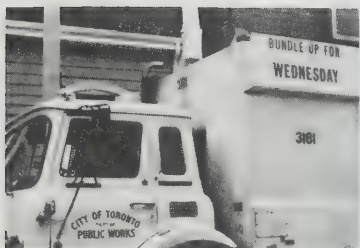
- \* 1. 425 Old Weston Road, east side, north of St. Clair Ave West (opposite Darrigo's)
- 2. Southport Street, south end of shopping centre, north of Club Kingsway
- \* 3. 1116 King Street West, north side, two blocks east of Dufferin Street (opposite Fraser Avenue)
- \* 4. Pears Avenue, south side of Ramsden Park, west of Yonge Street
- \* 5. 381 Greenwood Avenue, east side at Walpole Avenue (immediately south of C.N.R. crossing)
- \* 6. 30 St. Lawrence Street, west side, south of King Street East, one block west of River Street
- 7. 2721 Danforth Avenue, between Main Street and Daves Road (Darrigo's parking lot)
- 8. Bayview Avenue and Eglinton Avenue, centre of Dominion Store parking lot
- 9. Bayview Avenue, west side, north of Davisville Avenue (in front of Dominion Store parking lot)
- 10. Yonge Street, west side at Bedford Park Avenue (rear of A&P parking lot — entrance off Yonge Street or Bedford Park Avenue)
- 11. 723 College Street, Shaw Street side of Miracle Mart
- 12. St. Clair Avenue West, north side, east of Bathurst Street (Loblaws parking lot, east side)

- 13. Rose Avenue, west side, south of Prospect Street (Winchester School)
- 14. 17 Broadway Avenue, south side, east of Yonge Street (North Toronto Collegiate Institute)
- \* 15. Castlefield Avenue, south side, just east of Bathurst Street
- 16. Towers-Loblaws shopping centre, east side of Dundas Street, first block south of Bloor Street
- \* Department of Public Works Yards

This paper contains recycled mill waste.

The above information is correct as of July 1979, for current information phone TRAC 367-7850

## General information



### DOES YOUR GARBAGE LOOK LIKE THIS?



- We're quickly running out of places to dump it.
- It is a waste of energy and resources.
- Collection and disposal cost you \$42.00 per person in 1978.

### YOUR GARBAGE COULD LOOK LIKE THIS —



### IF YOU FOLLOW THE 3 R's OF LIMITING WASTE.

### THE 3 R's OF LIMITING WASTE

#### REDUCE

- whenever possible, avoid buying goods which have been over-packaged
- avoid disposable products such as paper plates and cups, paper diapers, and disposable razors; alternatives are available

#### REUSE

- save and reuse such things as wrapping paper, string, rubber bands, plastic containers, and bags
- buy beverages in refillable containers
- don't discard what can be repaired
- make used furniture, appliances, clothes, etc. available to such organizations as the Society for Goodwill Services by calling 362-4711 for free pick-up

#### RECYCLE

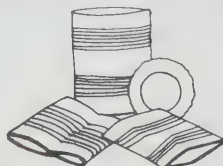
- compost your food and garden wastes; call TRAC for written instructions
- put your bundled newspapers out for Wednesday's special pick-up by the City Public Works Department
- take your bottles and cans to the nearest recycling depot (see map on reverse side)

## Material preparation instructions

### PREPARATION OF BOTTLES AND CANS FOR RECYCLING



- separate bottles by colour — clear, green, brown
- do not include white, blue or window glass, pyrex, light bulbs, or dishes
- remove labels only if they are metallic
- remove and discard all plastic or metallic neck rings, tops, or caps



- all cans can be recycled
- remove paper labels
- rinse and flatten
- do not include aluminum foil or plates

### BUNDLE UP FOR WEDNESDAY



Newspapers are collected and sold for recycling into insulation, egg cartons, boxboard, etc. Toronto could sell much more paper than it currently collects.

- special pick-up crews collect newspapers every Wednesday (except in the weeks that include a holiday)
- do not put newspapers out with regular garbage on normal collection days; they are treated like ordinary garbage and are not recycled
- bundle your papers with string; no bags or boxes, please
- do not include magazines or other used paper products
- place the bundles at the curb Tuesday night or before 7 a.m. Wednesday
- call 367-7742 if your papers are missed
- papers in the area bounded by Jarvis St. and Spadina Ave. south of Bloor St. are not picked up regularly; you may call 367-7742 and request a pick-up

TRAC is a special committee of Toronto City Council. It is not a closed group. We welcome your ideas and participation.

## Appendix I: GLOSSARY OF TERMS

**Baling:** the process of compressing and binding materials.

**Broker:** a person or organization that buys and sells recovered materials without actually handling the material.

**Bulk-Lift:** the process of lifting and/or transporting material in bulk, usually in a specially designed container.

**Collection:** the process of picking up and transporting material.

**Collection Route:** the route followed by a truck for the purpose of collection. See Collection.

**Contaminant:** any substance mixed with a recovered material that reduces the market value of that material. Unacceptable contaminants are usually specified by the buyer of recovered material.

**Cost Allocation (Direct):** a method of cost accounting in which only the expenses that can be readily identified with the program are included.

**Cost Allocation (Full):** a method of cost accounting in which all recovery program expenses are included. This method is sometimes technically known as absorption costing.

**Curbside Collection:** the act of collection from the curbside.

**Dealer:** a person or organization that buys, physically handles, and sells recovered material.

**Depot:** a drop-off point for the accumulation and temporary storage of source-separated materials.

**Disposal:** the process of permanently discarding useless or unwanted materials in sanitary landfill.

**Diverted Disposal Rate:** the quantity of material removed from the waste stream as a proportion of the total amount of waste generated.

**Front-Loading Truck:** a truck that loads material by inserting hydraulic forks into a container full of material, lifting the container over the top of the cab, and dumping the contents of the container into the truck body. The container is returned to the surface and remains on site for continued use.

**Generator:** the person or organization (e.g., residence, institution, or industry) at whose property waste initially accumulates.

**Handling Facility:** a site where recovered materials are off-loaded, stored, and loaded for shipment to buyer. Warehousing and processing may take place. It may be fed by material from depots and/or from collections.

**Marketing:** the act or process of selling or purchasing goods in a market situation.

**Multi-Material Recovery Program:** an operating system in which two or more types of waste materials are recovered for the purpose of recycling.

**Multiple Pass:** the collection of separated waste materials where the collection route is repeated for each material or combination thereof. This may occur on separate days.

**Municipal Solid Waste:** solid waste collected by a municipality or by a private hauler on behalf of a municipality. It includes residential solid waste and trash, and some light commercial solid waste.

**Packer Truck:** a conventional refuse collection vehicle with a compacting mechanism to increase the density of the collected waste. Depending on design, packers may be manually loaded from the rear or from the side.

**Participation Rate:** the number of pick-up points participating as a proportion of the total number of pick-up points passed by the truck in the program area during a specified period of time. (Distinct from recovery rate.)

**Processing:** any method or treatment designed to change the physical form of solid waste—e.g., volume reduction and/or upgrading.

**Rear-Loading Truck:** a packer truck equipped with hydraulic forks for lifting a container full of material, dumping the contents of the container into the truck's rear hopper, and returning the container to the surface.

**Reclamation:** See Recovery

**Recovery:** the process of obtaining materials and/or energy resources from solid waste.

**Recovery Rate:** the quantity of a material recovered as a proportion of the total amount of that material available in the waste stream.

**Recyclable Material:** material that when recovered from the waste stream has value as a raw material in the manufacturing process.

**Recycling:** the process by which waste materials are transformed into new products in such a manner that the original products may lose their identity.

**Refuse:** See Solid Waste

**Residential Solid Waste:** solid waste that initially accumulates in a residential environment (sometimes called domestic solid waste).

**Reuse:** the return and reuse of articles and materials without entry into the disposal or recycling systems.

**Roll-Off Container:** a container for bulk-lift of material used in conjunction with a roll-off hoist truck.

**Roll-Off Hoist Truck:** a truck that loads materials by pulling an entire container full of material onto the rear of its chassis. (Since the entire container is removed, an empty container for future use is rolled off the chassis before the full container is rolled on.)

**Secondary Material:** See Recyclable Material.

**Separate Collection:** the process of picking up and transporting materials destined for recycling separately from mixed waste.

**Single-Material Recovery Program:** an operating system in which only one type of waste material is recovered—e.g., newspaper, or glass, or cans.

**Single Pass:** the collection of waste materials where the route is covered only once.

**Solid Waste:** any waste with insufficient liquid content to be free flowing. See Waste.

**Source:** the place at which waste initially accumulates.

**Source Separation:** the process of keeping recyclable material separate from waste. (The term is loosely used to mean the process of separation and recovery, through to end-user.)

**Storage:** the process of aggregating material.

**Transfer Station:** a facility where waste materials are transferred from collection vehicles to larger transportation units.

**Upgrading:** the process of improving the quality of material by removing contaminants or by sorting into subcategories.

**Volume Reduction:** the process of increasing the density of a material—i.e., by crushing, shredding, or baling.

**Warehousing:** storage under cover.

**Waste:** any material or product that has served the purpose for which it was originally intended.

**Waste Composition:** the identifiable materials or products in the waste stream.







This paper stock contains de-inked, post-consumer, waste fibre.